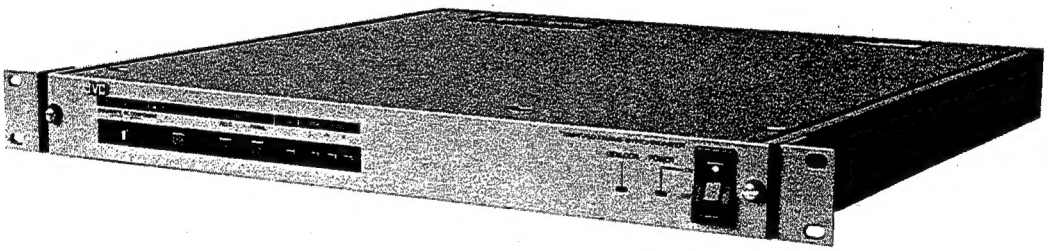
No. 6455

JVC Service Manual



MODEL **KM-F250E**

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Printed in Japan

Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▒) parts are critical for safety.
   Replace only with specified part numbers.
   Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Fuse replacement caution notice.
   Caution for continued protection against fire hazard.
   Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors
   5) Barrier

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

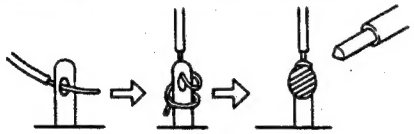


Fig. 1

7. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosen it.

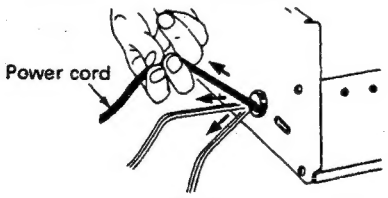


Fig. 2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

    1) **Connector part number** : E03830-001
    2) **Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.
    3) **Replacement procedure**
       (1) Remove the old connector by cutting the wires at a point close to the connector.
       Important : Do not reuse a connector (discard it).

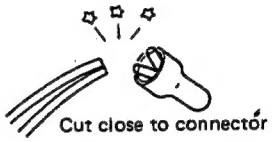


Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

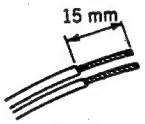


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

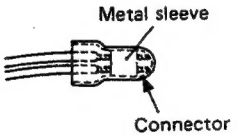


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

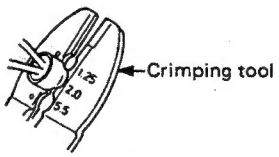


Fig. 6

(5) Check the four points noted in Fig. 7.

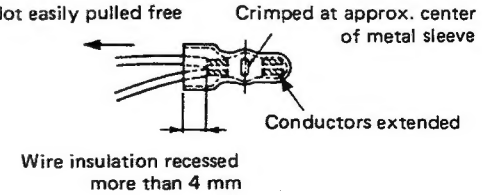


Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions, Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

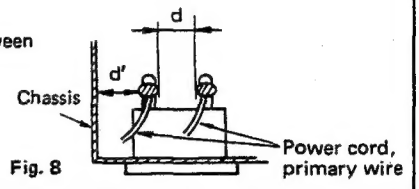


Fig. 8

4. **Leakage current test**
   Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).
   Measuring Method: (Power ON)
   Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts.
   Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

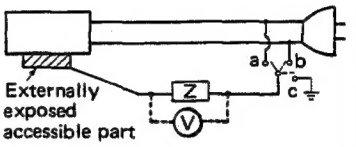


Fig. 9

5. **Grounding (Class I model only)**
   Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).
   Measuring Method:
   Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

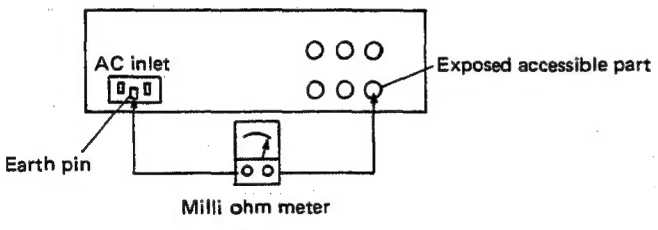


Fig. 10

Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	Z ≦ 0.1 ohm
Europe & Australia	Z ≦ 0.5 ohm

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	R≧1 MΩ/500 V DC	AC 1 kV 1 minute	d, d' ≧ 3 mm
100 to 240 V			AC 1.5 kV 1 minute	d, d' ≧ 4 mm
110 to 130 V	USA & Canada	—	AC 900 V 1 minute	d, d' ≧ 3.2 mm
110 to 130 V 200 to 240 V	Europe & Australia	R≧10 MΩ /500 V DC	AC 3 kV 1 minute (Class II) AC 1.5 kV 1 minute (Class I)	d ≧ 4 mm d' ≧ 8 mm (Power cord) d' ≧ 6 mm (Primary wire)

Table 1 Specifications for each region

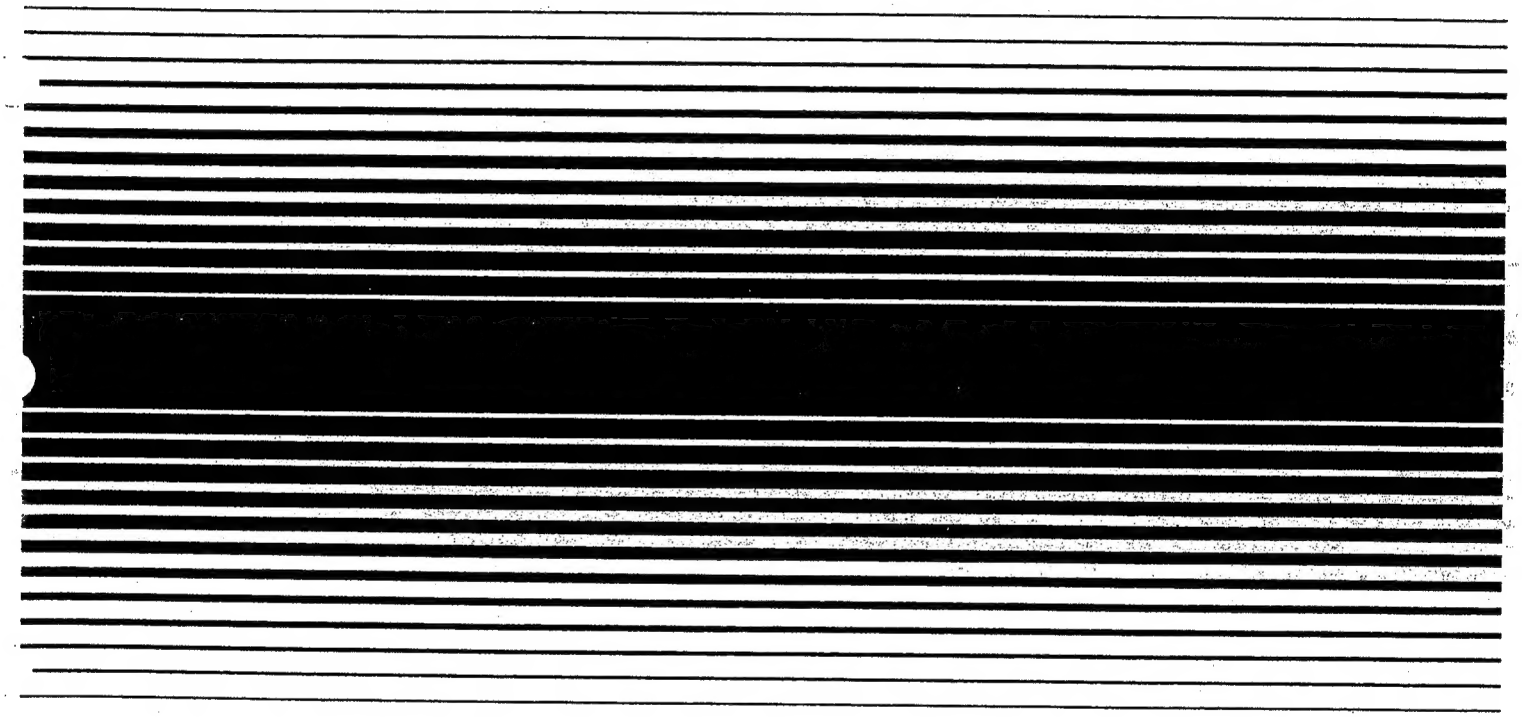
AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan	1 kΩ	i ≦ 1 mA rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 μF, 1.5 kΩ	i ≦ 0.5 mA rms	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia	2 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Other terminals

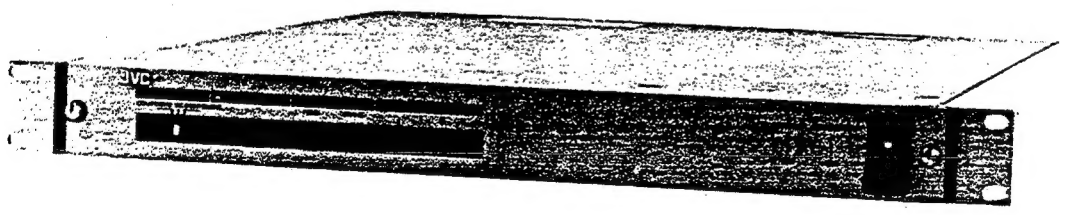
Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

JVC Instructions

FRAME SYNCHRONIZER
KM-F250





For Customer Use:

Enter below the Serial No. which is located on the top of the cabinet. Retain this information for future reference.

Model No. KM-F250

Serial No. _____

The instructions are given in three languages:
English from page 1 to 10
German from page 11 to 20
French from page 21 to 30

Bedienungsanleitung in drei Sprachen:
Englisch: Seite 1 bis 10
Deutsch: Seite 11 bis 20
Französisch: Seite 21 bis 30

Les explications techniques sont données en trois langues:
Anglais, page 1 à 10
Allemand, page 11 à 20
Français, page 21 à 30

Due to design modifications, data given in this instruction book are subject to possible change without prior notice.

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

Warning Notice
FOR YOUR SAFETY

To ensure safe operation the three-pin plug supplied must be inserted only into a standard three-pin power point which is effectively grounded through the normal household wiring.
Extension cords used with the equipment must be three-core and be correctly wired to provide connection to earth ground. Wrongly wired extension cords are a major cause of fatalities.
The fact that the equipment operates satisfactorily does not imply that the power point is properly grounded and that the installation is completely safe. For your safety, if in any doubt about the correct grounding of the power point, consult a qualified electrician.

WARNING – THIS APPLIANCE MUST BE EARTHED
IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:

GREEN-AND-YELLOW:	EARTH
BLUE:	NEUTRAL
BROWN:	LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows. The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the safety earth sumbol ⏚ or coloured GREEN or GREEN-AND-YELLOW. The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

Thank you for purchasing the JVC KM-F250 Frame Synchronizer. To gain maximum benefit from it and for correct operation, please read these instructions carefully. After reading, retain this booklet for future reference.

This unit is a multifunction, multipurpose frame synchronizer incorporating freeze and TBC functions. It can be used as a TBC equipped with a frame memory to correct time-base errors from a VTR, or it can be used to obtain a still picture from VTR playback signals using its freeze function.

CONTENTS

FEATURES

- **Full-frame (625-line) time-base correction**
  Standard PAL-B signals conforming to the CCIR standard can be obtained at the COMP VIDEO OUT connectors, even with non-V-locked VTRs.
- **Compact and lightweight, incorporating a 1-Mbit memory IC**
  This unit can be mounted in a 1H (44 mm or 1-3/4" high) space in an EIA 19" rack.
- **Frame/field selectable freeze function**
- **DOC (Dropout Compensator)**
- **Multi-format transcoder function built in**
  This unit is a multi-format synchronizer which adapts to all possible VTR output signal formats including Composite Video (PAL-B), *Y/C Separate Video and Component Video (Y, B-Y, R-Y). With its built-in transcoder function, this unit can output signals of these three different formats simultaneously: Composite Video (PAL-B), *Y/C Separate Video and Component Video (Y, B-Y, R-Y).
  *Y/C Separate Video:
  1 Y/C 443 signal for S-VHS VTR
  2 Y/C 924 signal for 3/4" High-band U-VCR
  3 Y/C 629 signal for VHS VTR
  One of either 1 , 2 or 3 signal is available.
  With input 2 or 3, the Y/C separate signal is used together with the composite signal.
- **Component processing**
  The signal processing circuitry is based on component signal processing, which provides the best frequency characteristics possible.
- **Remote control facility**
  Wired remote control is available using the optional RM-P250 remote control unit.

PRECAUTIONS

Safety Precautions

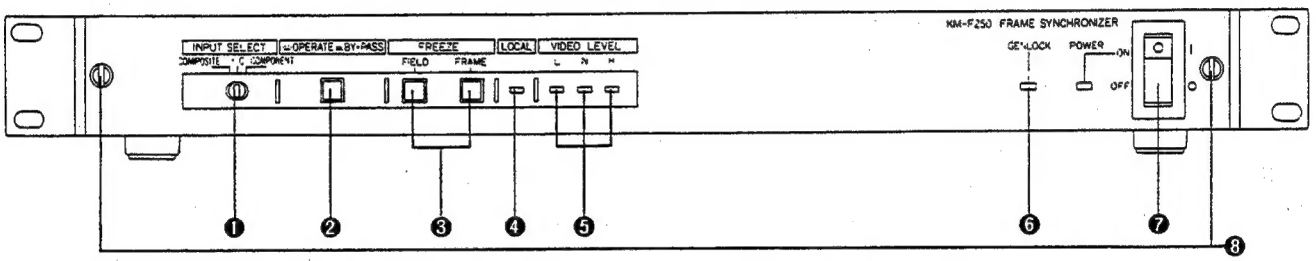
- Use only with the rated power supply (100 – 240 V AC, 50/60 Hz).
- Do not modify the unit or operate it with the cover panel removed.
- Do not allow inflammable objects, water or metallic objects to get inside the unit as it will cause damage or malfunction.
- When unit is not used for a long period of time, be sure to disconnect the power cord from the power outlet.
- When there is an abnormality (noise, smell, smoke, etc.) with the unit, immediately switch off, disconnect the power cord from the power outlet, and contact your nearest JVC-authorized service agent.

Handling Precautions

- A cooling fan is provided in the rear panel.
  When mounting the unit in a rack, etc., assure sufficient ventilation space at the rear.
- When using the Y/C separate video output of a 3/4" U-VCR or VHS VTR, employ the provided 7-pin/7-pin BNC cable.
- When using the Y/C separate video output of a S-VHS VTR, employ an optional 7-pin/7-pin cable.

CONTROLS, CONNECTORS AND INDICATORS

Front Panel



❶ INPUT SELECT switch
Set this switch according to the output format of the VTR.
COMPOSITE: For standard PAL-B composite signal (VBS).
Y/C: For Y/C separate signal (Y/C 443, Y/C 924, Y/C 629).
COMPONENT: For component signals (Y, R-Y, B-Y).

Notes:
- Precaution on using the Y/C position:
  Inside the unit there is a select pin for selecting a Y/C signal input. Prior to shipment, this select pin has been preset to accommodate Y/C 924 and Y/C 629 signals. When inputting the Y/C 443 signal, it is necessary to change the internal selection. For this, consult a JVC-authorized service agent.
- Y/R-Y/B-Y signals must be of the same phase.
  CTCM (Chroma Time Compressed Multiplex) signal cannot be used.

❷ OPERATE/BY-PASS mode button
When power is turned on, the initial mode is the Operate mode, in which the lamp in the switch lights. This lamp goes off in the By-pass mode.
Pressing this button alternates between the following operation modes.
OPERATE: Signals with their time base corrected are output from the video output connectors (COMP VIDEO, Y, R-Y, B-Y, Y/C OUTPUT).
BY-PASS: The signals from the VTRs connected to the video input connectors are looped through and output from the video output connectors corresponding to the input connectors.

Notes:
- No signal output is available when the POWER switch is set to OFF.
- When the input signal is Y/C 924 or Y/C 629, the BY-PASS mode cannot be used.

❸ FREEZE buttons
FIELD: Pressing this button activates field freeze, and the button lights. To cancel field freeze, press the button again.
FRAME: Pressing this button activates frame freeze, and the button lights. To cancel frame freeze, press the button again.

❹ LOCAL indicator
This LED lights when the LOCAL/REMOTE switch behind the front panel is set to LOCAL.

❺ VIDEO LEVEL indicators
The input video level is indicated in three ways.
L: Lights when the input level is low.
N: Lights when it is normal.
H: Lights when it is high.

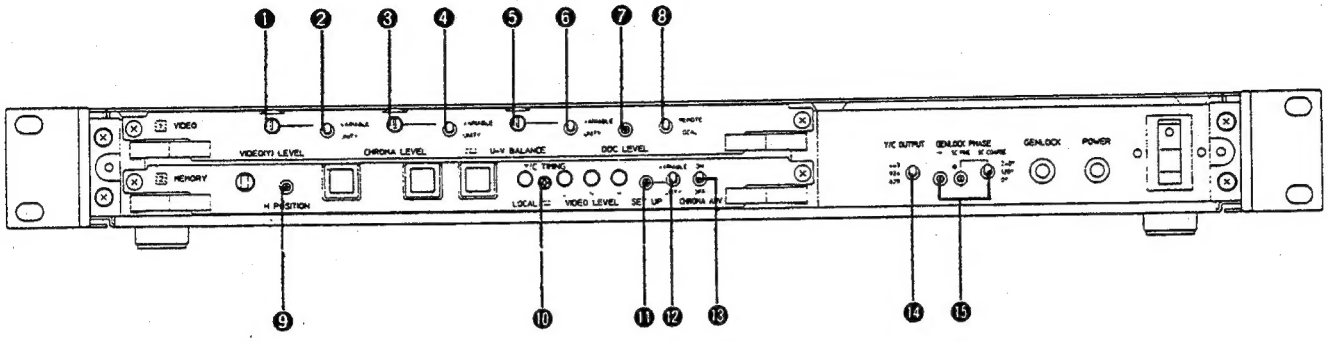
❻ GENLOCK indicator
This LED lights when a genlock reference signal is applied to the GENLOCK connector on the rear panel.

❼ POWER switch
Power is turned on when the "ON (I)" segment is depressed. The LED indicator lights when power is on.

❽ Front panel opening screws
To operate the switches and controls behind the front panel, loosen the screws (on the left and right sides) and remove the front panel.

Note: Check the setting of the INPUT SELECT switch before removing the front panel. After removal of the front panel, if the switch is found to have shifted, reset it to the original position.

Behind Front Panel



❶ VIDEO (Y) LEVEL control
When the VIDEO (Y) LEVEL VARIABLE/UNITY switch ❷ is set to "VARIABLE", the output video signal level can be adjusted by ±3 dB using this control. The SYNC level is not affected by this adjustment.

❷ VIDEO (Y) LEVEL VARIABLE/UNITY switch
VARIABLE: For adjusting the video level with the VIDEO (Y) LEVEL control ❶.
UNITY: The output video signal level is the same as the input video signal level, regardless of the position of the VIDEO (Y) LEVEL control ❶.

❸ CHROMA LEVEL control
When the CHROMA LEVEL VARIABLE/UNITY switch ❹ is set to "VARIABLE", the output chroma level can be adjusted by ±3 dB using this control.

❹ CHROMA LEVEL VARIABLE/UNITY switch
VARIABLE: For adjusting the chroma level with the CHROMA LEVEL control ❸.
UNITY: The output chroma level is the same as the input chroma level, regardless of the position of the CHROMA LEVEL control ❸.

❺ U-V BALANCE control
When the U-V BALANCE VARIABLE/UNITY switch ❻ is set to "VARIABLE", the U and V level of the output signal can be adjusted within ±3 dB, by using this control. (Increasing one decreases the other.)

❻ U-V BALANCE VARIABLE/UNITY switch
VARIABLE: For adjusting the U and V level with the U-V BALANCE control ❺.
UNITY: The output U and V level is the same as the input chroma phase, regardless of the position of the U-V BALANCE control ❺.

❼ DOC LEVEL control
Adjusts the dropout detection level of the DOC circuit.

❽ LOCAL/REMOTE switch
LOCAL: Set to this position when operating this unit using the controls on this unit.
REMOTE: Set to this position when operating this unit from the remote control unit (RM-P250, optional) connected to the rear panel. When set to this position, the switches and controls on this unit are disabled.

❾ H (horizontal) POSITION control
In the Operate mode, this potentiometer allows the output H video position to be adjusted within ±1 μsec.
When shipped from the factory, this control was adjusted to output the same H video position as the by-pass output. Therefore it is not necessary to adjust this control in normal operations.

❿ Y/C TIMING control
With Y/C separate signal inputs, the H phase of the chroma (C) signal can be adjusted within ±1 μsec with respect to that of the luminance (Y) signal.

⓫ SET UP control
When the SET UP VARIABLE/UNITY switch ⓬ is set to "VARIABLE", the output signal setup level can be adjusted by ±10 % using this control.

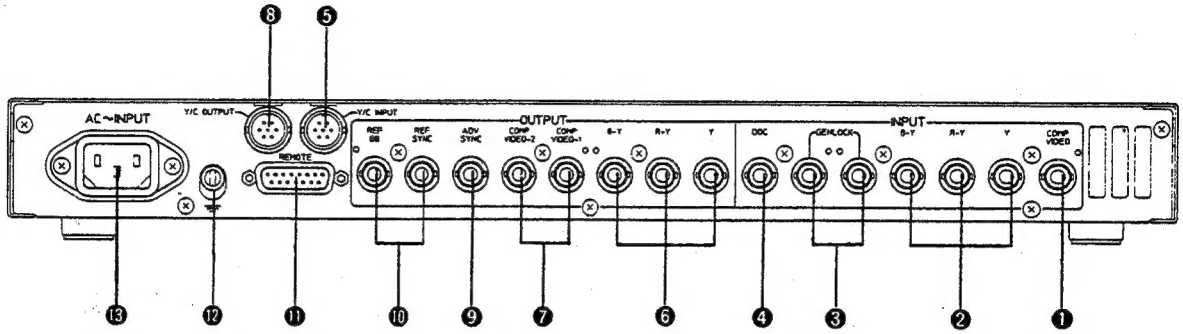
⓬ SET UP VARIABLE/UNITY switch
VARIABLE: For adjusting the output signal setup level with the SET UP control ⓫.
UNITY: The output signal setup level is the same as the input signal setup level, regardless of the position of the SET UP control ⓫.

⓭ CHROMA ADV switch
When this switch is set to ON, the chroma output signal is advanced by 1H with respect to the luminance (Y) signal.

⓮ Y/C OUTPUT select switch
Set to the appropriate position depending on the recording VTR connected to the rear panel Y/C OUTPUT connector.
443: When an S-VHS VTR is connected.
924: When a 3/4" high-band U-VCR is connected.
629: When a VHS VTR is connected.

⓯ GENLOCK PHASE controls
In genlock operation, the horizontal sync and colour sync (subcarrier) phases of the video and reference signal outputs can be adjusted with respect to the genlock reference signal (BB or VBS) input via the GENLOCK connector on the rear panel.
H: Horizontal phase control.
SC FINE: Subcarrier phase fine-adjustment control.
SC COARSE: Subcarrier phase coarse-adjustment switch, for 240°, 120° or 0°.

Rear Panel



Video/sync signal inputs

❶ **[COMP VIDEO] Composite video signal input connector**
Connect the video output of a VTR which outputs composite video signal.

❷ **[Y, R-Y, B-Y] Component video signal input connectors**
Connect the time-base corrected Y, R-Y and B-Y outputs of a VTR which outputs component video signals.

❸ **[GENLOCK] External sync reference input connectors**
Connect the composite video (VBS) or black burst (B.B) signal for use as the reference signal. One of the two connectors can be used as a loop-through terminal. When loop-through output is not required, terminate the unused connector with the 75-ohm termination plug provided.

❹ **[DOC] Dropout signal input connector**
This input is used to detect dropouts in the VTR output signal. Connect the reproduced RF signal output (DOC OUT) of a VTR.

> **Note:** Do not connect to the television output RF converter.

❺ **[Y/C INPUT] Y/C signal input connector**
Connect the Y/C separate video output from the 7-pin connector of a VTR.

Video signal outputs

> When the front panel OPERATE/BY-PASS button is set to "OPERATE", the time-base corrected video signals are output simultaneously at connectors ❻ ❼ ❽. If the button is set to "BY-PASS", each input signal is looped through and output from the output connector with the same name as the input connector. No signal is available when power is off.

❻ **[Y, R-Y, B-Y] Component video signal connectors**
Connect to a VTR equipped with the component video inputs.

❼ **[COMP VIDEO -1, -2] Composite video signal output connectors**
Connect to a VTR equipped with the composite video input.

❽ **[Y/C OUTPUT] Y/C signal output connector**
Connect to a VTR equipped with a 7-pin Y/C separate video input.

Sync signal outputs

❾ **[ADV SYNC] VTR servo lock signal output connector**
Connect to the playback VTR equipped with an external sync facility. It is most effective when using time codes for editing, etc.

> This output is advanced by 8H with respect to the REF outputs. The amount by which it is advanced can be switched internally to 4H. If this is required, please consult a JVC-authorized service agent.

> **Note:** This unit can also be used for VTRs not equipped with an external sync facility. However, pictures may not appear natural with some VTRs or tapes.

❿ **Reference sync signal output connectors**
These output the reference sync signal generated by the SSG incorporated in the unit. To genlock the system using these signals, connect these outputs to the sync inputs of the components making up the system.
REF SYNC: Outputs the composite sync signal.
REF BB: Outputs the black burst signal.

Other connectors

⓫ **[REMOTE] Remote control connector**
For the remote control of this unit using the Local mode, connect the optional RM-P250 remote control unit.

⓬ **[⏚] Grounding terminal**
This is the system ground terminal.
To prevent malfunctions caused by noise, connect to the chassis of components and rack, etc.

⓭ **[AC INPUT] Power supply connector**
Supply the rated voltage using the AC power cord provided.

INSTALLATION (Rack Mounting)

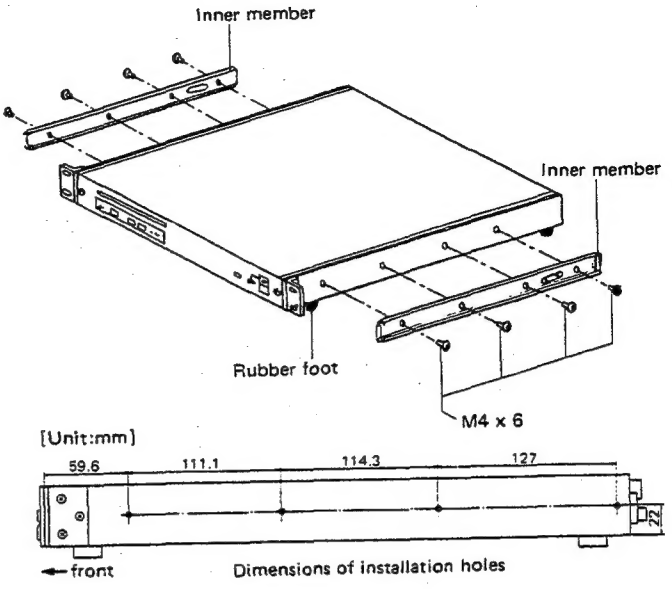
This unit can be mounted in an EIA 19" rack using the threaded holes in the side panels.

1. Remove four screws retaining the four rubber feet, and remove the rubber feet.
2. Attach the inner members of the slide rails to the left and right side panels.
3. Attach the outer members of the slide rails to the rack, and slide the unit into the rack.

The following slide rails can be attached to this unit.

Model	Manufacturer	Slide Length
C-305-20	Accuride (U.S.A.)	20"

Note: For the procedure required to attach the outer members to the rack, consult the dealer of the slide rails or rack.



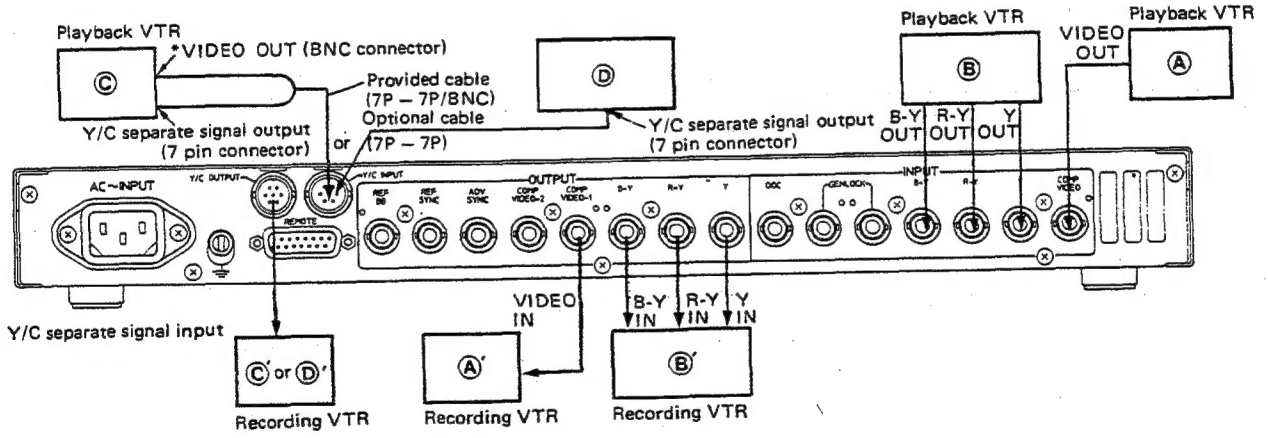
CONNECTIONS

Connection to Video Recorders

Depending on formats of the input/output signal of the VTRs, connect them as shown in the diagram below.
This unit is capable of handling three signal formats shown in the table.

Signal Format	Usable VTRs	Symbol
PAL-B composite signal	3/4" VCR, 1/2" VHS, etc.	Ⓐ, Ⓐ′
Component signal (Y, R-Y, B-Y)	MII VTR, etc. (TBC built in)	Ⓑ, Ⓑ′
Y/C separate signal	3/4" U-VCR or VHS VTR (independently selectable for input with internal select pin and for output with Y/C OUTPUT switch)	Ⓒ, Ⓒ′
	S-VHS VTR	Ⓓ, Ⓓ′

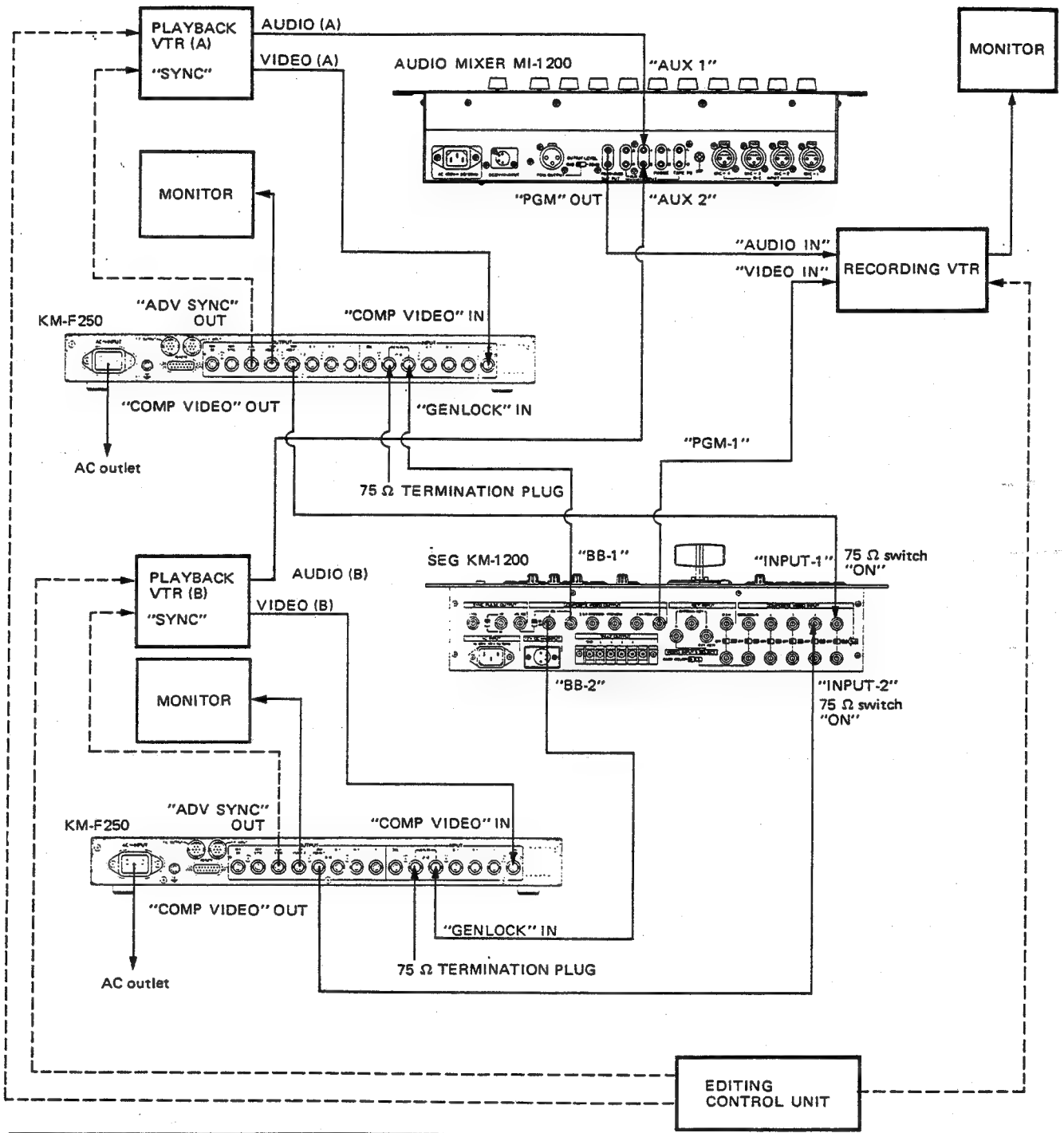
(*Be sure to connect the provided cable to VTR's VIDEO OUT.)



Notes:

- When a JVC CR-850E or CR-600E VCR is used as a playback VTR, set its SYNC select switch to either the "EXT" or "VIDEO" position. The "TBC" position is to be used when a subcarrier feedback type TBC is used, not this unit. If used with the "TBC" setting, pictures may not be stable in the REW and FF modes.
- When the Y/C separate signal from an S-VHS VTR is to be input to this unit, an optional 7-pin/7-pin cable can also be used, not necessarily the provided cable.
- When the playback VTR is in the FF mode, noise bars appear at the bottom of the screen. This is not due to any defect of the unit.
- When recording VTR Ⓐ′ is used, if you want a black-and-white signal output from a colour signal input, connect the recording VTR to the Y OUTPUT connector.
- In the Operate mode, the outputs to recording VTRs Ⓐ′ Ⓑ′ Ⓒ′ are output simultaneously.

System Connection Example (Using Composite VTRs)

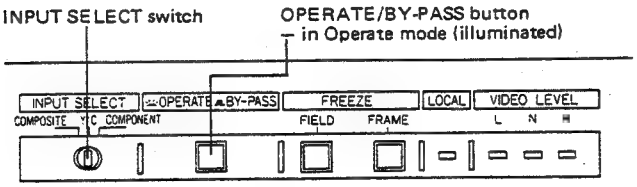


Note: For time-code editing, supply ADV SYNC from this unit to the recording VTR. Otherwise, the edit timing could drift. (ADV SYNC is a sync signal for use by the playback VTR. To apply sync to the recording VTR, use the REF SYNC output.)

OPERATION

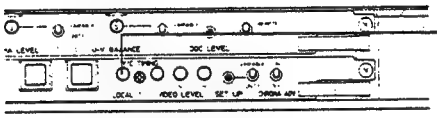
1. INPUT selection

1. Connect the system components following the instructions in "Connections".
2. Turn on the power of the components.
3. Check that the OPERATE/BY-PASS button is lit indicating that the unit is in the Operate mode.

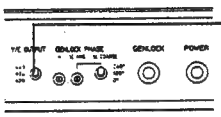


4. Set the INPUT SELECT switch according to the format of the input video signal. Inside the unit there is a select pin for selecting a Y/C signal input. Prior to shipment, this select pin has been preset to accommodate Y/C 924 and Y/C 629 signals. When inputting the Y/C 443 signal, it is necessary to change the internal selection. For this, consult a JVC-authorized service agent.
   If the Y/C position is selected, it might happen with some playback VTRs that the H phases of the luminance and chroma signals do not coincide with each other. In such a case, adjust them with the Y/C TIMING control.

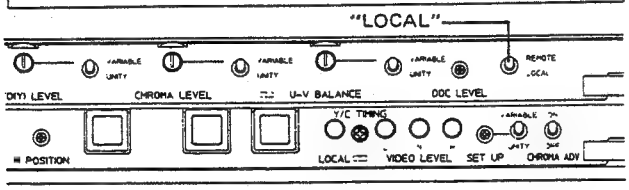
> **Note:**
> With some VTRs, the Y/C timing is different between the playback and EE modes. Therefore, even after adjustment with the Y/C TIMING control, there may be a case in which the Y/C delay occurs in the EE mode.



5. If the Y/C OUTPUT connector is used, set the Y/C OUTPUT switch correctly depending on the type of the VTR to be connected.



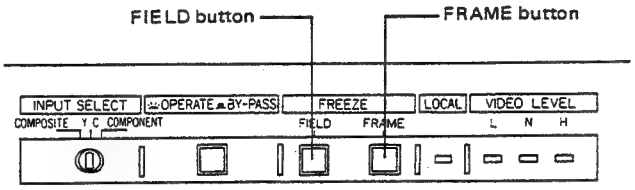
> **Note:** The front panel operations are invalid if the LOCAL/REMOTE switch behind the front panel is set to REMOTE. In this case, remove the front panel and set the switch to LOCAL.



2. FREEZE Function

The freeze function stores the video signal corresponding to one picture in memory so that still pictures can be reproduced from the memory.

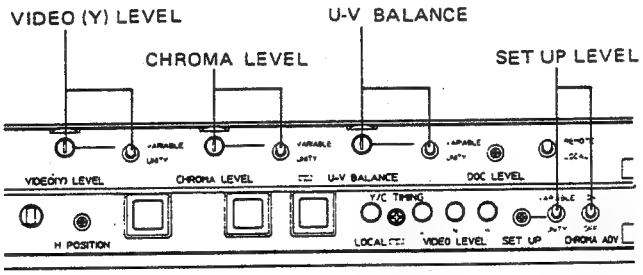
1. Set the OPERATE/BY-PASS button for the OPERATE mode (so the button lights) and play back the VTR.
2. Press one of the FREEZE buttons (FIELD or FRAME) when the scene to be frozen appears. Field freeze or frame freeze is performed depending on the button pressed. The button lights while freeze is activated. To release the freeze mode, press the button again.



3. VARIABLE/UNITY Switches

When the Operate mode is selected with the OPERATE/BY-PASS button, the levels of the output signal can be varied as follows.

- Video level (without varying Sync level) . . . . . ±3 dB
- Chroma level . . . . . ±3 dB
- U-V balance . . . . . ±3 dB
- Setup level . . . . . ±10 %



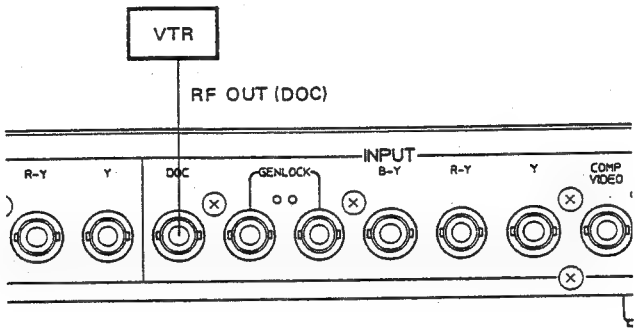
1. Remove the front panel by loosening the screws on the left and right.
2. Set the OPERATE/BY-PASS button for the Operate mode (with the button lit), and play back the VTR.
3. Set the VARIABLE/UNITY switches of the items to be adjusted to "VARIABLE", and adjust the controls.

4. DOC (Dropout Compensator) Circuit

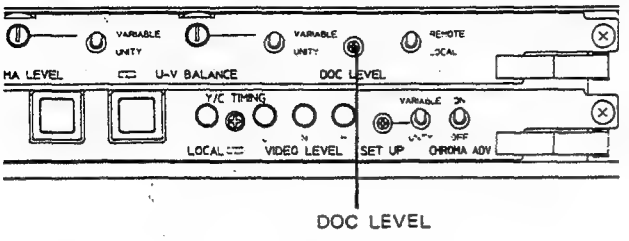
When dropouts occur in the VTR playback signal, the DOC circuit compensates by inserting the signal one frame before into the frame including dropout.
However, the DOC circuit will operate if a VTR without an RF (DOC) output is connected.

> **Note:** The television RF output cannot be used.

1. Connect the rear panel DOC connector to the VTR's RF OUT (DOC) connector.



2. Adjust the dropout detection level for an optimum picture, by using the DOC LEVEL control behind the front panel.



DOC LEVEL

5. LEVEL Indicators

The VIDEO LEVEL indicators on the front panel indicate the input video signal level.

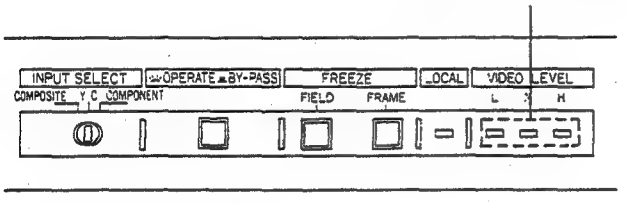
- L: Lights when the input level is low.
- N: Lights when it is normal.
- H: Lights when it is high.

If the "L" or "H" indicators light all the time, set the VIDEO (Y) LEVEL VARIABLE/UNITY switch behind the front panel to "VARIABLE" and adjust the VIDEO (Y) LEVEL control so that the "N" indicator lights.

Notes:

- The indication varies according to the contents of the input signal. Therefore, it is recommended that the video level be adjusted while the color bars signal is being played back.
- In the BY-PASS mode, the "L" indicator remains lit.

VIDEO LEVEL indicators



6. GENLOCK operation

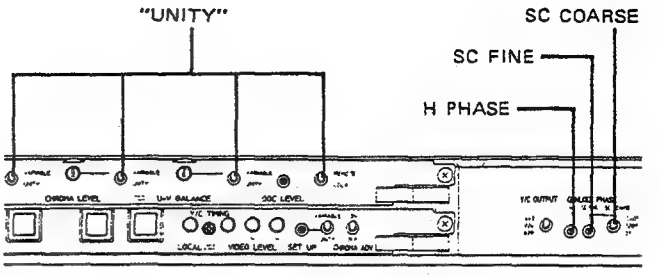
Genlock operation of this unit is possible by supplying a composite video (VBS) or black burst (B.B) signal to the GENLOCK connector.

The phases in the output video signal can be varied with respect to the input reference signal within the following ranges.

- Horizontal sync signal: ±1.5 μsec
- Chroma phase: More than 360°

For phase adjustment, follow the procedure below.

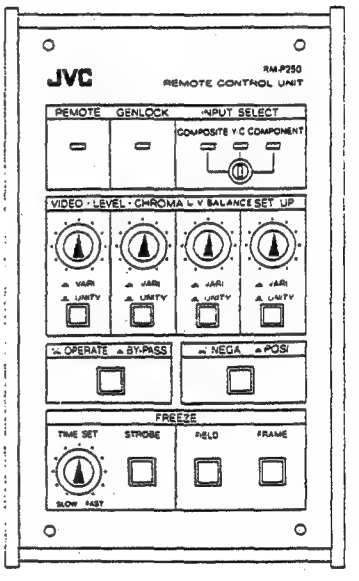
1. Remove the front panel by loosening screws on the left and right.
2. Set the OPERATE/BY-PASS button for the Operate mode.
3. Set all the VARIABLE/UNITY switches to "UNITY".
4. Adjust the following switch and controls.
   - Horizontal sync signal: H PHASE control
   - Chroma phase: SC COARSE switch (0°, 120°, 240°)
     SC FINE control (±60°)



7. Remote Control Unit

The functions listed below can be remote-controlled by connecting the optional RM-P250 remote control unit.

For connection and operation, refer to the Instructions provided with the RM-P250.



Remote control functions

- Operate/By-pass mode switching
- Input signal selection
- Freeze (Field, Frame)
- Strobe freeze
- Strobe freeze time setting
- Nega/Posi switching
- Video level adjustment
- Chroma level adjustment
- U-V balance adjustment
- Setup level adjustment

When the KM-F250 is used on its own, Strobe freeze, Strobe freeze time setting and Nega/Posi switching cannot be performed. The RM-P250 is required for these functions.

TROUBLESHOOTING

Power cannot be turned on.
- Check if the power cord is connected.

Corrected signal is not output.
- Check if the OPERATE/BY-PASS button is set for the Operate mode.
- Check if the INPUT SELECT switch is set to suit the play-back VTR's signal format.
- Check if the Y/C OUTPUT select switch is set to suit the recording VTR, when using one with Y/C input.

The switches, buttons and controls on the front panel and behind it cannot be operated.
- Check if the LOCAL/REMOTE switch is set to "LOCAL".

The output video level, chroma level and/or U-V level are far different from those of the input signal.
- Check if the VARIABLE/UNITY switches are set to "UNITY".

Picture is distorted when an SPG is connected.
- Check if the genlock signal is supplied correctly.

SPECIFICATIONS

Input Signals
- Composite video (VBS) : 1 Vp-p, 75 ohms
- Y/C separate : Y/C 443 (S-VHS) . . . 1
  Y = 0.7 V/0.3 V (sync), 75 ohms
  C (4.43 MHz) =0.3 Vp-p(burst), 75 ohms
  Y/C 924 (U-VCR) . . . 2
  Y = 0.35 V/0.15 V (sync), 75 ohms
  C = 1 Vp-p(VBS), 75 ohms
  Y/C 629 (VHS) . . . 3
  Y = 0.35 V/0.15 V (sync), 75 ohms
  C = 1 Vp-p(VBS), 75 ohms
  (*One of either 1 , 2 or 3 signal is available by inner select pin)
- Component : Y = 0.7 V/0.3 V (sync), 75 ohms
  R-Y = 0.7 Vp-p (100 % colour bars), 0.525 Vp-p (75 % colour bars), 75 ohms
  B-Y = 0.7 Vp-p (100 % colour bars), 0.525 Vp-p (75 % colour bars), 75 ohms
- Reference sync : Black burst (B.B) 0.45 Vp-p, or PAL-B composite video 1 Vp-p, 75 ohms. Loop-through output.
- DOC : RF carrier 3 to 10 MHz, 0.2 to 1 Vp-p, 75 ohms

Output Signals
- Composite video (VBS) : 1 Vp-p, 75 ohms, Two outputs provided
- Y/C separate : Y/C 443 (S-VHS) . . . 1
  Y = 0.7 V/0.3 V (sync), 75 ohms
  C (4.43 MHz) = 0.3 Vp-p(burst), 75 ohms
  Y/C 924 (U-VCR) . . . 2
  Y = 0.35 V/0.15 (sync), 75 ohms
  C (924 kHz) = 0.5 Vp-p, 75 ohms
  Y/C 629 (VHS) . . . 3
  Y = 0.35 V/0.15 V (sync), 75 ohms
  C (629 kHz) = 0.5 Vp-p, 75 ohms
  (*One of either 1 , 2 or 3 signal is available by SELECT switch)
- Component : Y = 0.7 V/0.3 V (sync)
  R-Y = 0.7 Vp-p (100 % colour bars), 0.525 Vp-p (75 % colour bars), 75 ohms
  B-Y = 0.7 Vp-p (100 % colour bars), 0.525 Vp-p (75 % colour bars), 75 ohms
- ADV SYNC : 4 Vp-p, 75 ohms
- REF SYNC : 4 Vp-p, 75 ohms
- REF BB : 0.45 Vp-p, 75 ohms

Quantization : 13.5 MHz, 8-bit (Comforms to the CCIR REC. 601)

TBC Range : 625 H

S/N : 57 dB (p-p/RMS)
100 kHz – 5 MHz

Residual jitter (no external reference sync)
- Composite video : ±15 nsec
- Component : ±15 nsec
- Y/C separate : Luminance ±15 nsec, hue ±3°

K Factor (2T Pulse)
- Composite video : 3 %
- Component : 1 %
- Y/C separate signal : 1 %

Frequency Characteristics
- Composite video : 3.2 MHz, within $^{+0.5}_{-3}$ dB
- Component : Y: 5.2 MHz, within $^{+0.5}_{-3}$ dB
  R-Y/B-Y: 2.2 MHz, within $^{+0.5}_{-3}$
- Y/C separate : Y = 5.2 MHz, within $^{+0.5}_{-3}$ dB
  C = 500 kHz, within –3 dB

Power Supply : 100 – 240 V AC, 50/60 Hz

Power Consumption : 40 W

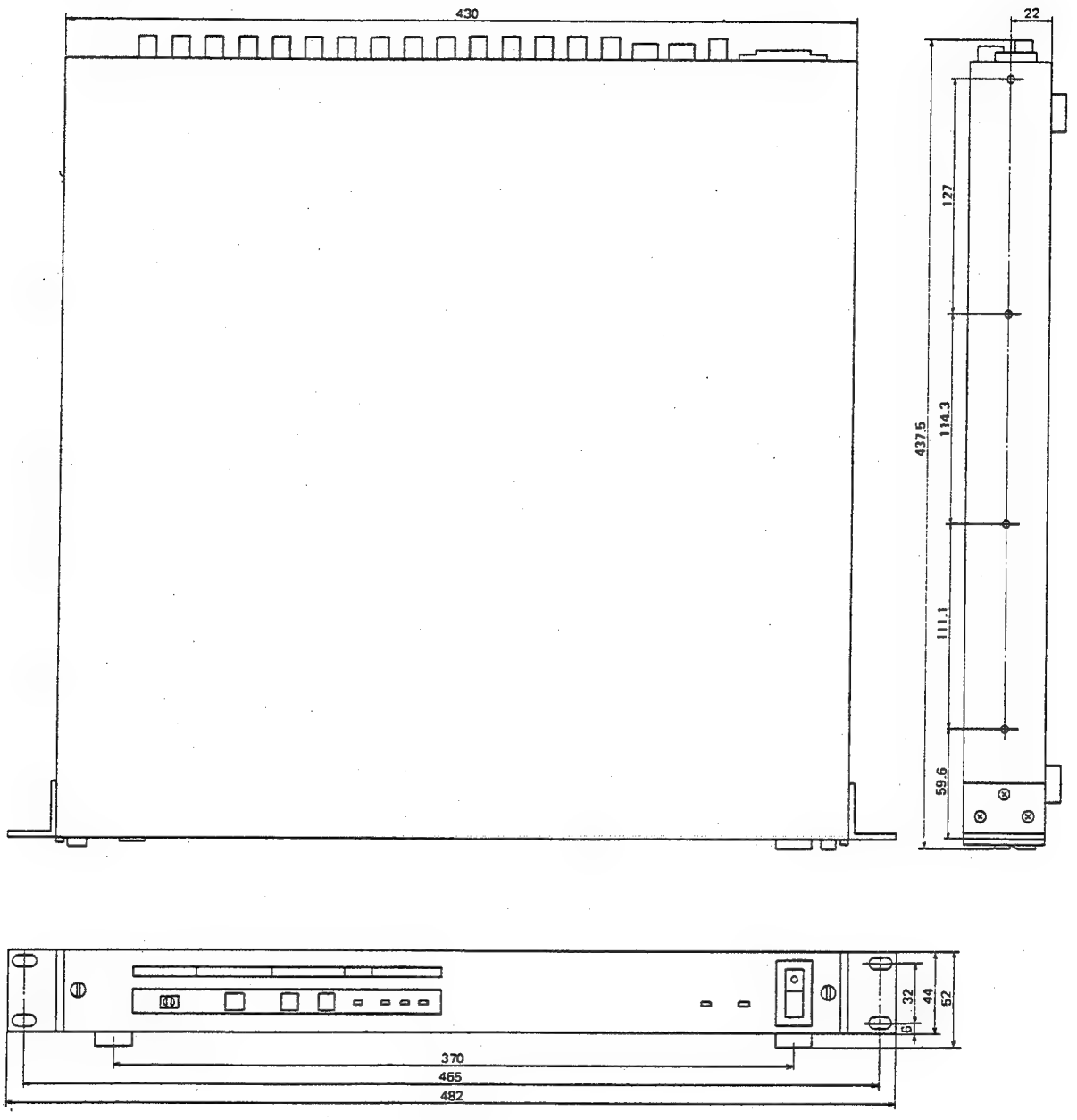
Ambient Temperature : 5 to 40°C (41 to 104°F)

Weight : 6.9 kg (15.2 lbs)

Accessories : Power cord . . . . . .
EG type : QMP4908-250
EK type : SCV0419-2M5
EA type : SCV0420-2M5
75-ohm termination plug . . .
Y/C cable (7P–7P/BNC) . . .

Design and specifications are subject to change without notice.

Dimensions (Unit: mm)



JVC

VICTOR COMPANY OF JAPAN, LIMITED

Printed in Japan
SC96319

SECTION 1
CIRCUIT DESCRIPTION

1.1 CIRCUIT DESCRIPTION

The KM-F250E contains the following circuit boards.

1. RL circuit board
2. CN circuit board
3. MT circuit board
4. VIDEO circuit board
5. MEMORY circuit board
6. SG circuit board
7. PS circuit board
8. REG circuit board
9. SUB circuit board
10. PB DET circuit board

These are described in this order.

1.1.1 RL circuit board

This circuit board permits the analog video signal input to the input signal terminal on the rear of the KM-F250 to be fed to the VIDEO circuit board or the input signal to be loop-through output from the KM-F250 as is. The switching of this OPERATE/BY-PASS switching circuit is done by the OPERATE/BY-PASS switch on the front panel of the KM-F250. The control signal for switching is generated by the MEMORY circuit board, passed through the CN circuit board, then controls the relay (RL1 – RL6) on this RL circuit board to switch the input signals.

1.1.2 CN circuit board

This contains the input circuit for the various control signals when the remote control unit (RM-P250) is connected. When the LOCAL/REMOTE switch on the front panel of the KM-F250 is set to the "REMOTE" position, control signals are input from the RM-P250.

1.1.3 MT circuit board

This is the mother circuit board which links the other circuit boards. One feature is that, so that the VIDEO circuit board can alternate with the MEMORY circuit board, the connector through which signals are exchanged has common specifications. When servicing the MEMORY circuit board, replace it if required. Usually, be sure to use the KM-F250 with the VIDEO circuit board inserted above the MEMORY circuit board. Otherwise, there is a possibility that noise or unnecessary signals will be introduced.

1.1.4 VIDEO circuit board

Functionally, the VIDEO circuit board is separated into the input processor and output processor.

1. Input processor

The different input signals including the composite video signal (VBS), Y/C* separate signals (Y/C443, Y/C924 or Y/C627) and component (Y, R-Y, B-Y) signals are subject to various types of processing. Although the processing of each input signal is different depending on the type of signal, all signals are converted into component signals (VTR Y, VTR B-Y and VTR R-Y) before being fed to the MEMORY circuit board. At the same time, the VTR SYNC signal is produced from the input signal, and this is then fed to the MEMORY circuit board. And Drop-out detection circuit is provided for drop-out correction.

*Y/C443 for S-VHS VTR
Y/C924 for 3/4" U-VCR
Y/C627 for VHS VTR

(1) Input select signal

The input processor has several common process circuits for different input signals, even though they are of different types. For this reason, the input of the common circuits uses an analog switch which permits switching between input sources.

Switching between signal formats (COMPOSITE, Y/C and COMPONENT) is done by the INPUT SELECT switch on the front panel.

When switching the INPUT SELECT switch, INPUT SELECT-A and INPUT SELECT-B signals are generated. These signals are fed to the VIDEO circuit board.

The input can be a high or low signal, which varies in accordance with the select state as shown in the table below.

Control signals \ Input signal	COMPOSITE	Y/C		COMPONENT
		Y/C924 Y/C627	Y/C443	
INPUT SELECT A	L	H		L
INPUT SELECT B	H	L		L

Table 1-1

(2) Sync separation circuit and generation of BFP

The circuit composed of Q43, Q44, Q45, IC5 and IC6-A/B is the sync separation circuit to which input signal is supplied through IC1-C. IC1-C is an analog switch which is switched according to a signal selected by the INPUT SELECT switch on the front panel of the KM-F250E.

Signals switched by IC1-C are as follows:

1) Y signal separated from composite input signal.
   (This separation circuit will be mentioned later.)
2) Y signal of Y/C input signal
   If input Y/C signal is Y/C443, it is supplied as having the same level, on the other hand, Y/C627 or Y/C924 is once amplified two times in level by Q101 and Q102 before it is sent to IC1-C. Selection to amplify input signal or not can be done by changing the connection of the connector J2.

One of the above three signals is supplied to the sync separation circuit as input signal.

The sync separation circuit separates sync portion from input signal and sends it to the memory circuit board as VTR SYNC signal, which is utilized as a source of control signals to write data on the frame memory in the memory circuit.

This VTR SYNC signal is treated by a monostable multivibrator composed of IC7-A/B and IC8-A of the next stage to be H. pulse and VTR BFP necessary for the color signal processing circuit which will be described later.

These VTR SYNC signal, H. pulse and VTR BFP contain the same jitter component as that in input video signal.

(3) Conversion of composite signal into component signal

Composite signal which passed the analog switch IC1-A branches into two lines; one is input to the Y signal separation circuit and the other is input to the color difference signal conversion circuit.

1) Y signal separation circuit
   The circuit composed of Q2, Q3, L1 to L4, and C2 to C6 is an LPF (3.5-MHz approx.) which removes color components. In the next stage, carrier components of the input signal is removed by a 4.43-MHz trap (CT1). As a result, Y signal is obtained and its K factor and gain are adjusted by the circuit composed of Q4 to Q7, and then supplied to TP1 through IC1-C.
2) Color difference signal separation circuit
   This circuit is also used for decoding chroma signal of Y/C signal to color difference signal.
   Q11 to Q13, L7, L8, C16 to C19 compose an BPF that separates luminance component from composite signal.
   Chroma signal separated by the BPF is supplied to IC4 (AN5625N of Matsushita) which is a chroma signal processing circuit for TV and decodes chroma signal to color difference signals (R-Y, B-Y) by inputting H. pulse and VTR BFP which is synchronized with input Y/C signal.

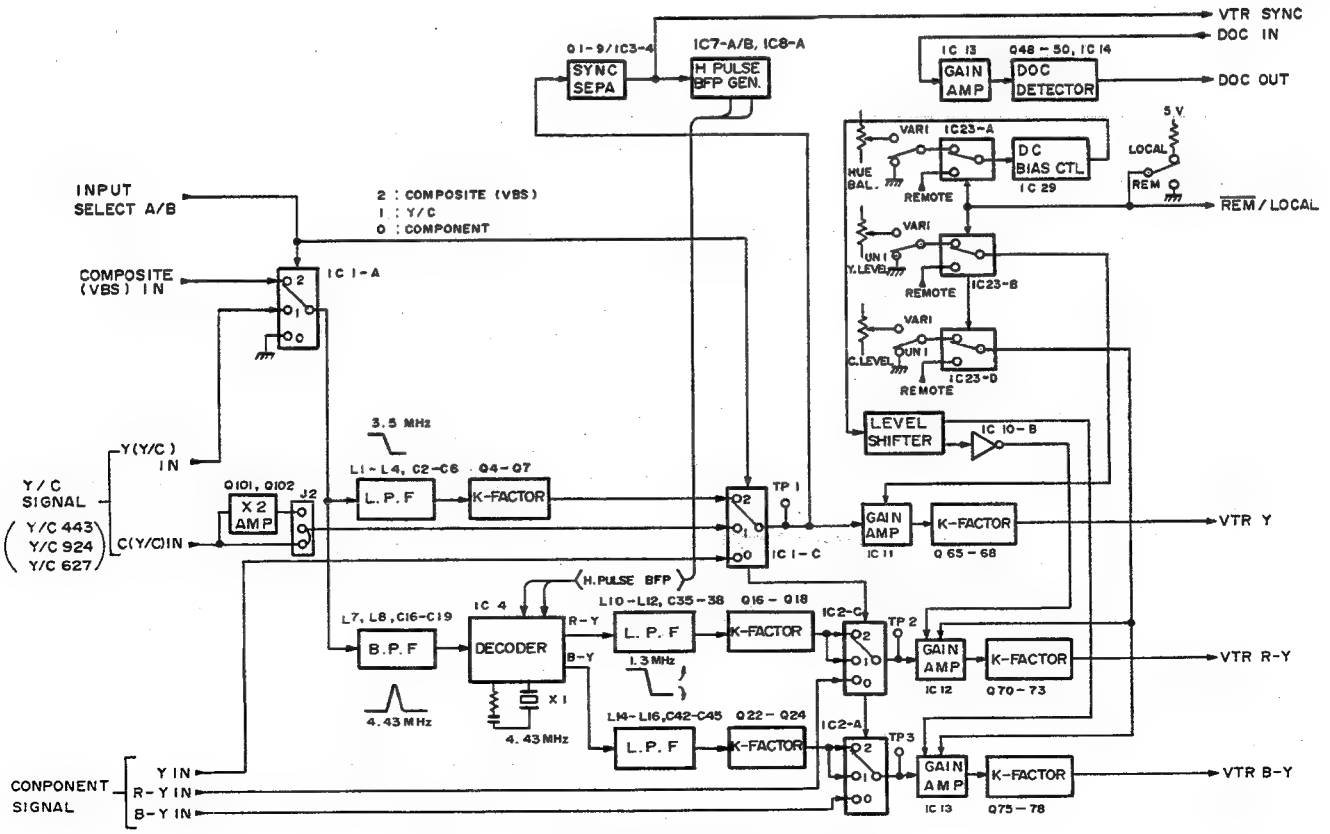


Fig. 1-1 Block diagram of the input processor

DL1 is a 1H delay line which is necessary to decode the signal with line corelation.
Decoded R-Y and B-Y color difference signals are supplied to a 1.3-MHz LPF to suppress their harmonic distortions. After each K factor is adjusted, the color difference signal is input to IC2-C and IC2-A which are analog switches to be switched with a signal selected by the INPUT SELECT switch on the front panel. Switched R-Y signal is supplied to TP2, while B-Y signal to TP3.

(4) Conversion from Y/C signal to component signal

Y/C signals applicable as input signals to the KM-F250E are three of the following.

1) Y/C443 : Y/C signal whose C (chroma) signal is 4.43 MHz for S-VHS format
2) Y/C924 : For 3/4" hi-band U-VCR. Chroma signal is 924 kHz.
3) Y/C627 : For VHS format. Chroma signal is 627 kHz.

Since there is no chroma up converter built in the KM-F250E, the above 2) and 3) Y/C signals cannot be input to it directly. To solve this problem, connection cables for the exclusive use of the KM-250E are provided to input composite signal as color signal, therefore, color signals of the above mentioned Y/C signals 1) through 3) are input to the KM-F250E as 4.43 MHz chroma signal. Every kind of the chroma signal is decoded to R-Y and B-Y color difference signals by the color difference signal separation circuit (refer to the item (3)-2) in the same manner as composite signal input.
Separated R-Y signal is supplied to TP2 and B-Y signal to TP3.

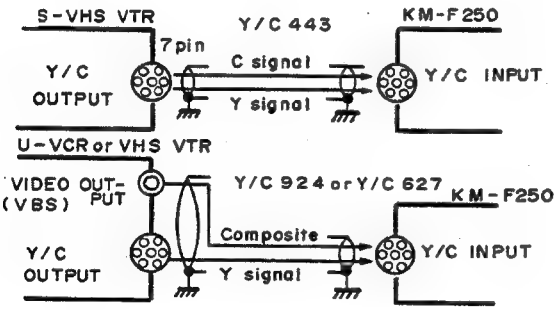


Fig. 1-2

In principle, Y signal need not be processed and it is treated as component signal as it is. However, in case of the Y/C924 and Y/C627 signals, Y signal is amplified by Q101 and Q102 since it is input at a level of 0.5 Vp-p.
Y signal is supplied to TP1 to be output from it.

(5) Level control/K-factor circuit

Although processing differs depending on the source of each input (composite, Y/C, component), the Y signal appears at TP1, the R-Y signal appears at TP2, and B-Y signal appears at TP3 irrespective of the type of input signal.
The level of each component signal is adjusted by gain control ICs IC11, IC12 and IC13, then any distortion is corrected by the K-factor circuit connected in the subsequent stage.
The K-factor circuit is adjusted by inputting the 2T pulse (square sine wave).
In this way, each component signal is sent the MEMORY board as the VTR Y, VTR R-Y and VTR B-Y signals.

(6) Dropout detection circuit

In the case there is dropout in the VTR playback signal, the built-in dropout detector circuit detects the missing portion in the RF signal fed from the VTR.
The detected DOC pulse is sent to the MEMORY board, then when digital video data is written to the memory IC, dropout is corrected by changing the data to the data 1H before.
The circuit block consisting of IC14, Q51 to Q53, and IC15 is a detector circuit.
IC14 is a differential amplifier, which amplifies the RF signal.
The balanced differential amplifier circuit consisting of Q51 and Q52 pulls the output low and switches Q53 on when dropout occurs.
In this way, when dropout occurs or VTR is in the stop mode, a negative-going TTL level DOC pulse is output via voltage comparator IC15 in the subsequent stage.

2. Output processor

The output processor not only outputs the time-axis corrected component signals from the MEMORY circuit board as the Y, B-Y and R-Y signals, but also encodes them to permit the output of a composite signal.
The S-VHS Y/C signal is obtained from the Y signal and 4.43 MHz C signal. Further, by down-converting the 4.43 MHz C signal, the 627 kHz or 924 kHz C signal is obtained, and at the same time, the Y/C627 or Y/C924 signal can be output.

(1) LPF/overshoot equalizer circuit

The TBC Y, TBC B-Y and TBC R-Y signals converted from digital signals to analog signals by the MEMORY circuit board are input to this circuit. The TBC R-Y signal is passed through the 2.5 MHz LPF consisting of buffer Q54 and C123 to C127 and L32 to L34 and the overshoot equalizer for this LPF. As the TBC R-Y signal D/A-converted by the MEMORY circuit board contains the digital component (digitization steps), this is eliminated.

The corrected R-Y signal is branched into two routes at the emitter of Q57; on one route, the signal is fed to CBM2 via C160, on the other route, the signal is fed to the base of Q58 via C129. The TBC B-Y and TBC Y signals are similarly corrected by passing through the LPF/overshoot equalizer circuit in the same way as the TBC R-Y signal.

The corrected B-Y signal is branched into two routes at the emitter of Q70, in the same way as the R-Y signal; one route, the signal is fed to CBM3 via C186, on the other route, the signal is fed to the base of Q71 via C170. The Y signal is mixed with the sync signal via R534 (SYNC LEVEL VR) at the emitter of Q82 before being amplified by Q83. After this, from the emitter of Q84, on one route the signal is supplied to Q85 via C194 and on the other route the signal is sent to CBM7 via C206.

(2) R-Y, B-Y and Y output driver circuits

This driver circuit outputs the R-Y, B-Y and Y signals output from the previous LPF/overshoot equalizer circuit from the KM-F250E.

CMB2 is the driver IC for the R-Y signal, CBM3 is the driver IC for the B-Y signal, and CBM7 is the driver IC for the Y signal. The driver ICs are identical.

The R-Y and B-Y signals are ground-clamped with the CP timing and the Y signal is ground-clamped with the BFP timing before being input to each CMB. Each CBM contains a balanced differential amplifier and gain is controlled by external VRs (R-Y signal: R538, B-Y signal: R539, and Y signal: R543).

The CBM outputs are sent to the operate/by-pass circuit on the RL circuit board.

(3) C (chroma) signal generation

The R-Y signal is amplified by amplifier Q59, then passed through buffer Q60 and clamped to 3.2 V DC before being introduced to color modulator IC19. Likewise, the B-Y signal is also input to color modulator IC21. The BFP (burst flag pulse) is added to both B-Y and R-Y signals before being modulated and becomes the burst flag SC signal at the output of the modulator. SC (subcarrier) signals having phase differences of –90°/+90° and 0° due to the quadrature circuit (Q76) are fed to IC19 and IC21 and the B-Y and R-Y signals are balance-modulated. The modulated B-Y and R-Y signals are mixed via R266 and R267, then passed through the BPF consisting of L36, L37 and C142 to C145 and buffer Q62, to form the C (chroma) signal having 3.5 MHz component. At the emitter of Q63, the C signal is branched into five channels: the chroma down-converter circuit, pilot burst mix circuit, the C (Y/C) output selection circuit, BB signal generator circuit and the Y/C mix circuit.

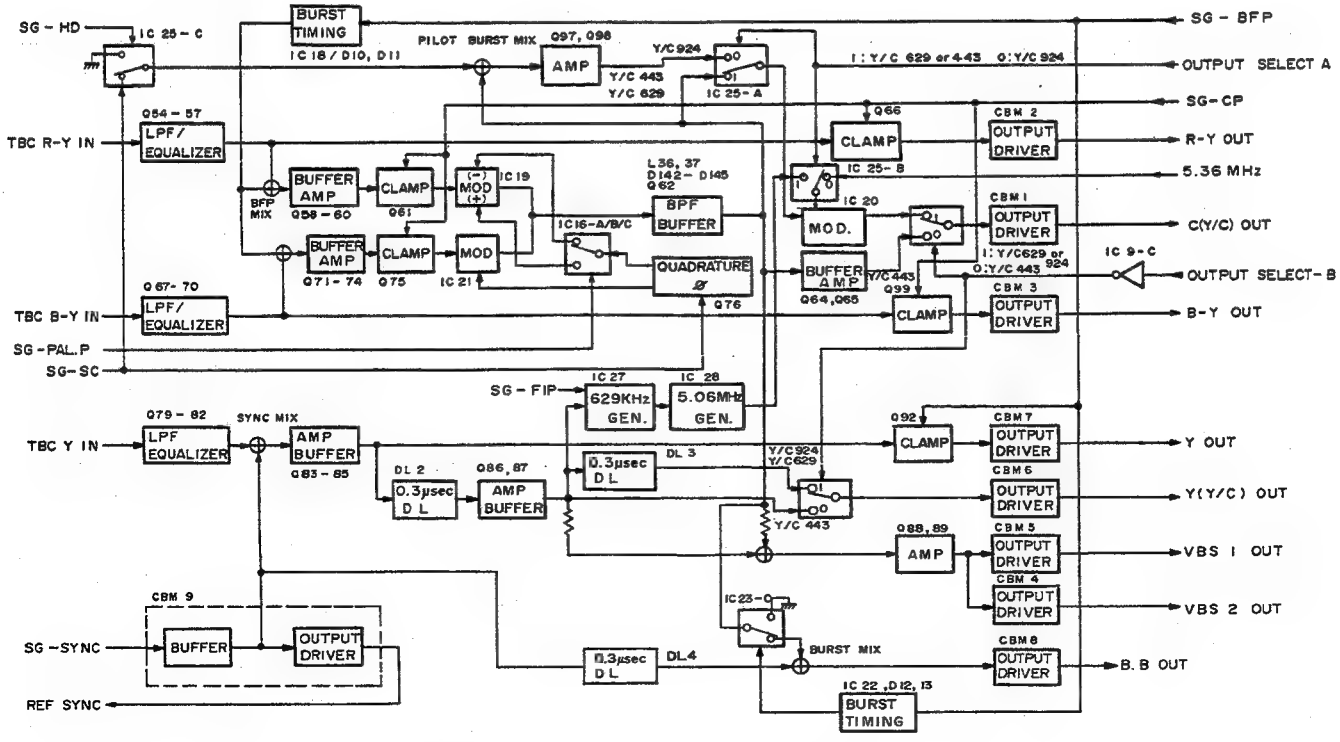


Fig. 1-3 Block diagram of the output processor

(4) Chroma down-converter

IC20 is the chroma down-converter which generates color signal either for Y/C627 or Y/C924. Namely, this modulates 4.43 MHz chroma signal input through pin 1 with carrier coming through pin 2.

The generated C (chroma) signal is just output of the C signal generation circuit, however in case of Y/C924, it is added with pilot burst signal which SG-SC signal is cut off being timed pilot BFP. This pilot BFP is the pulse obtained by inputting SG-HD signal to a monostable multivibrator IC24-A/B.

Switchover between C signals of Y/C627 and Y/C924 is done by switching of IC25-A with OUTPUT SELECT-A signal.

Regarding carrier frequencies, it is 5.06 MHz for Y/C627 and 5.36 MHz for Y/C924, both of which are generated separately. (The generating circuit will be described later.)

Switchover of the carriers for Y/C627 and Y/C924 takes place by switching of IC25-B with OUTPUT SELECT-A signal.

Pin 7 (MOD. OUT) simultaneously outputs two kinds of frequencies; one is sum of 4.43 MHz C signal and carrier and the other is difference of the two. The sum component is removed by an LPF of the next stage and only the difference component is supplied to the C (Y/C) output selection circuit.

Frequency of C signal is 627 kHz for Y/C627, while 924 kHz for Y/C924.

(5) C (Y/C) selection circuit and C (Y/C) output driver

The C (Y/C) selection circuit selects the chroma signal to be output to the Y/C OUTPUT terminal on the rear panel. The input signal to analog switch IC17-B/IC25-B is selected by the Y/C OUT SELECT-A/B signal from the Y/C OUTPUT switch behind the front panel.

When the Y/C OUTPUT switch is set to "Y/C924", 924 kHz C signal output from the above-mentioned chroma converter is supplied to CBM1 as C (Y/C) signal.

When the Y/C OUTPUT switch is set to "Y/C627", 627 kHz C signal output from the chroma converter is supplied to CBM1.

When the switch is set to "Y/C443", 4.43 MHz C signal output from the C signal generation circuit (mentioned previously) becomes the input to CBM1.

CBM1 is an output driver for C (Y/C) signal.

(6) Carrier generation circuit

This carrier generation circuit generates carrier waveforms used at the chroma down-converter mentioned above. Among carriers described in the following section 1.1.5. 5.36 MHz carrier is generated by the memory circuit board.

5.06 MHz carrier is generated by IC27 and IC28.

IC27 (AN6362 of Matsushita) is a color AFC circuit for a VTR, and in this set it is used to generate 627 kHz carrier synchronized with SG-SYNC signal. In practice, SG-SYNC itsself is not utilized but Y signal which passes through DL2 to tune its phase to that of C signal. IC27 separates SYNC signal from Y signal input to pin 8, and pin 12 outputs 627 kHz carrier synchronized with the SYNC signal by the internal AFC circuit. This 627 kHz carrier is then supplied to IC28.

IC28 (AN6371 of Matsushita) is a color APC circuit for a VTR of PAL format, and in this set this IC is used to generate 5.06 MHz carrier which is formed by internally modulating frequencies of 627 kHz carrier generated by IC27 and supplied to pin 9 of IC28 and of 4.43 MHz signal generated by X2. This 5.06 MHz carrier is supplied to the chroma down-converter via pin 8.

(7) Y/C mix circuit and composite output driver circuit

As the C signal is delayed by 0.3 μs with respect to the Y signal at the time of generation, it is necessary to match their phases when the Y and C signals are mixed. The Y signal is delayed by 0.3 μs by DL2, then amplified by Q86 and passed through buffer Q87 before being mixed with the C signal via R357 and R358. The delayed Y signal is input to the DUB Y output driver circuit from the emitter of Q87.

The composite signal with Y and C mixed is amplified by Q88 before being branched into two routes: on one channel, the signal is supplied to the VBS-1 signal output driver circuit (CMB5) then its gain is adjusted before it is fed to the operate/by-pass circuit on the RC board, and signal on the other route is fed to the VBS-2 signal output driver (CBM4).

(8) Y (Y/C) output driver circuit

The phase of the Y signal and Y/C627 or Y/C924 has to be matched with that of the C signal and the Y signal is delayed by 0.3 μs by DL3. After this, it is amplified by Q90 then output through the output driver CBM6.

In the case of the Y/C443 signal, as the C signal is not down-converted, it need not be delayed. The Y/C OUT SELECT-A/B signal causes the signal to bypass DL3.

(9) BB (black burst) signal generator circuit

SG-SYNC signal generated by the SG circuit board passes through a buffer inside CBM9 and then branches into two lines. On a route, the signal is supplied to the LPF/overshoot equalizer circuit to be mixed with Y signal, on the other route the signal is sent through DL4 to R536 for level adjustment, and then supplied to Q94's emitter to be mixed with burst signal. This mixed signal is B.B signal.

The burst signal is obtained by sampling burst components of C signal generated by the C signal generation circuit at a timing of SG-BPF pulse.

IC23-C is an analog switch to sample the burst signal.

This B.B signal is sent to the output driver CBM8 for gain adjustment.

1.1.5 MEMORY circuit board

The MEMORY circuit board can be divided into the following three blocks.

1. Video signal processing block (time base correction)
2. Control signal generator block (generation of control signals for the above processing)
3. Block providing other functions (FREEZE/DOC/ADV. SYNC, etc.)

1. Video signal processing block

The analog component signals (VTR Y, VTR B-Y and VTR R-Y) fed from the input processor on the VIDEO circuit board are converted into digital signals so that their time bases can be corrected.

Time base correction is done by writing data to the frame memory using the clock signal (VTR CLOCK) locked to the input VTR signal then reading it using the clock signal (REF CLOCK) locked to the internally genrated reference signal. Fig. 1-4 is a block diagram.

(1) Clamp circuit

After passing through buffers Q1, Q2 and Q3, the VTR Y, VTR R-Y and VTR B-Y signals are clamped immediately before amplifiers CBM1/2/3.

1) The VTR Y signal is clamped with the timing of the Y. CP (CP = clamp) signal to a level preset by the Y PED VR (R314). The Y. CP signal is a pulse generated at the BF (Burst Flug) position of the Y signal and is produced by the monostable multivibrator (IC7) based on the VTR SYNC signal produced by the VIDEO circuit board.

2) The VTR B-Y and VTR R-Y signals are clamped by the C. CP signal to a level preset by the R-Y C VR (R300) and B-Y C VR (315). The C. CP signal is a pulse generated at the sync tip position of the C signal (B-Y, R-Y) and is produced from the input VTR signal in the same way as the Y. CP signal described previously.

(2) A/D converter

The VTR Y signal and VTR C signal (VTR R-Y, VTR B-Y) are each divided by 858 in each 1 H period to convert them to 8-bit digital signals. The sampling frequencies are based on the digital studio TV coding method recommended in CCIR Rec 601; the Y sampling clock signal is 13.5 MHz whereas the R-Y/B-Y sampling clock signal is 6.75 MHz. The VTR R-Y and VTR B-Y signals are converted by respectively A/D converter using 6.75 MHz clock and mixed to become a C signal data. As a clock signal, the VTR CLOCK signal described later is used. The data created here is fed to the pre-1 H buffers (IC38/IC39).

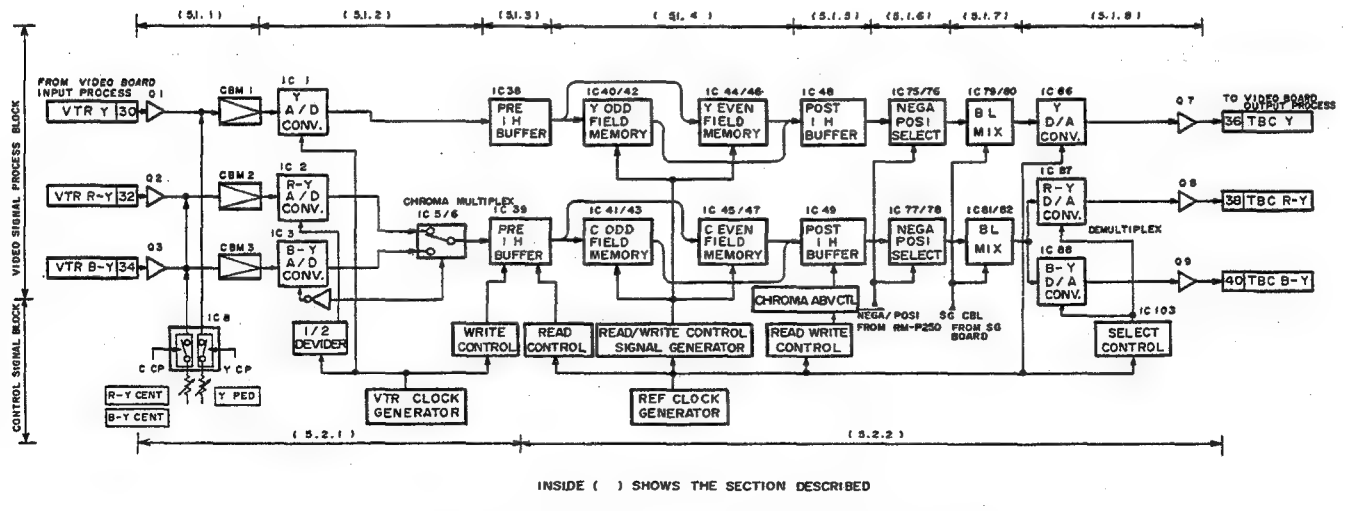


Fig. 1-4 Block diagram of the MEMORY circuit board

(3) Pre-1H buffer

As the VTR signal contains the jitter, there is no correlation between this and the reference clock signal (REF CLOCK) generated inside the KM-F250. As the frame memory IC operates locked to the reference clock signal, video data containing jitter cannot be input directly. Therefore, before data is sent to the frame memory, it is fetched once by the pre-1 H buffer, then output matching the write timing of the frame memory. The pre-1 H buffer is a 910 x 8 bit DRAM, to which data is written using the V. WCK signal locked to the VTR CLOCK (to be described later); this data is then read using the R. RCK1 signal locked to the REF CLOCK signal. Although the clock frequencies do not coincide, the data start positions coincide at all times. This is because the write and read start timings are locked to the $\overline{\text{VTR H}}$ signal. The read data is fectched sequentially by the frame memory.

Actual write and read timings are given in Fig. 1-5. The V. $\overline{\text{YRW}}$ (V. $\overline{\text{CRW}}$) is a write start signal and the R. $\overline{\text{RR1}}$ is a read start signal. The R. $\overline{\text{RR1}}$ signal is generated delayed by about 26 μsec from the V. $\overline{\text{YRW}}$ signal; as these signals reset the addresses in the buffer when they are started, data start positions of write and read coincide at all times. The data start position is set 6 to 7 μsec from the start of the sync signal.

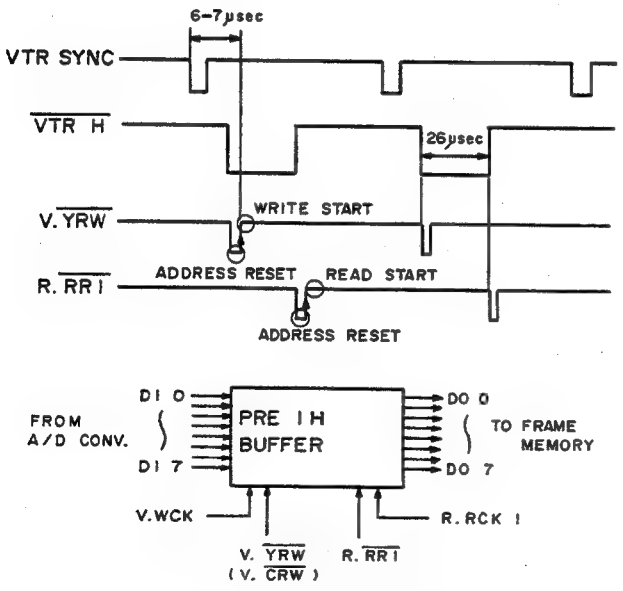


Fig. 1-5 Pre-1H buffer

(4) Frame memory

1) Memory configuration

As a frame memory IC, two 1-Mbit (256 kwords x 4 bits) DRAM are used per field and a total of 8 DRAMS are used for the Y and C signals. The memory configuration is shown in Fig. 1-6.

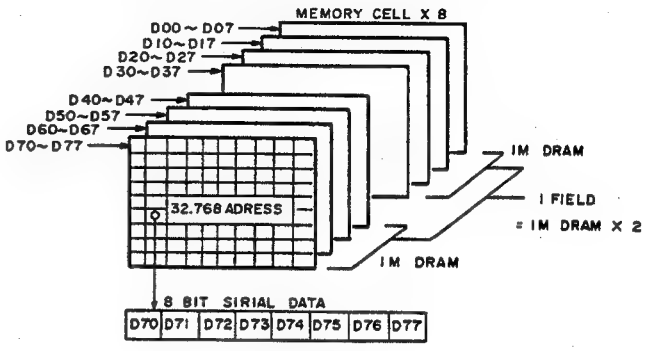


Fig. 1-6

One memory cell is assigned to each bit of the parallel 8-bit video data. One memory cell consists of 32,768 addresses, and the addresses to be read or written using the address data (to be described later) are simultaneously selected for the 8 memory cells. As one address in one memory cell can store 8 bits of serial data, a total of 64 bits of data can be held in memory for one address.

In other words, video data comes in 8-bit parallel units; therefore, 8 units of 8-bit video data (64 bits) can be input. The video data is divided into 858 data units per 1H, among which 768 data units excluding the sync period portion are held in memory. Therefore, 96 addresses are required for 1H, one field requires 30,000 addresses and one frame requires twice that, or 60,000 addresses. (See Fig. 1-7.)

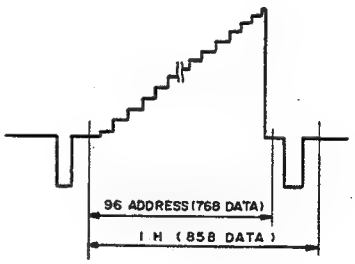


Fig. 1-7

2) Memory control system diagram

Fig. 1-8 shows the signals required for memory IC control. These control signals are obtained from the REF CLOCK signal. The roles and timings of these signals are described later.

3) Generation of address data

- Write address data

  The write address data is generated by four binary counters (IC55/57/59/61) whose close signal is obtained by counting down the REF CLOCK signal. 8 REF CLOCK pulses are required to count up each address.

  To be more precise, 1H requires 96 addresses and 1V requires 30,000 addresses. Therefore, the address data requires a 15-bit parallel signal. The counters are reset by the $\overline{\text{VTR H}}$ and $\overline{\text{VTR V}}$ signals. This is because the start timing of the video data input from the pre-1H buffer coincides with the $\overline{\text{VTR H}}$ signal. As result, the start timing of address data includes jitter, but address data itself doesn't contain any jitter.

- Read address data

  The generation method is almost the same as that of the write address data described previously. As reset pulses, the REF H and REF V signals obtained from the reference signal (REF CLOCK) are used and the clock pulse has reversed phase. By using the REF H and REF V signals, the both data and its start timing are locked to the reference signal.

4) Functions of memory IC control signals

- SIC, SOC, $\overline{\text{CE}}$, $\overline{\text{RS}}$, $\overline{\text{WS}}$, $\overline{\text{WE}}$: These are produced using the REF CLOCK signal and clock signals counted down to 1/2, 1/4 and 1/8 by passing through gates and flip-flops.

  *SIC: This is the shift-in clock. At the leading edge of this clock signal, the 8-bit serial data is written to the shift-in register within the frame memory IC, one bit at a time. In this way, writing can be done as required without being influenced by other control signals.

  *SOC: This is the shift-out clock. At the leading edge of the clock signal where the $\overline{\text{OE}}$ signal (to be described later) goes low, the serial data in the shift-out register is sent one bit at a time.

  *$\overline{\text{CE}}$: Chip enable signal. At the trailing edge of this signal, the address data and the CS signal (to be described later) are written to the frame memory IC.

  *$\overline{\text{RS}}$: Read strobe signal. When the $\overline{\text{RS}}$ signal goes low when $\overline{\text{CE}}$ = L, the data in the selected address is transferred to the shift-out register via the I/O controller (IC's inside).

  *$\overline{\text{WS}}$: Write strobe signal. When the $\overline{\text{WS}}$ signal goes low, the data in the shift register is latched by the I/O controller.

  *$\overline{\text{WE}}$: Write enable signal. When the $\overline{\text{WE}}$ signal goes low when $\overline{\text{CE}}$ = L, the data in the I/O controller is written to the address selected. When $\overline{\text{WE}}$ = H, write is inhibited and the mode is switched to the read mode.

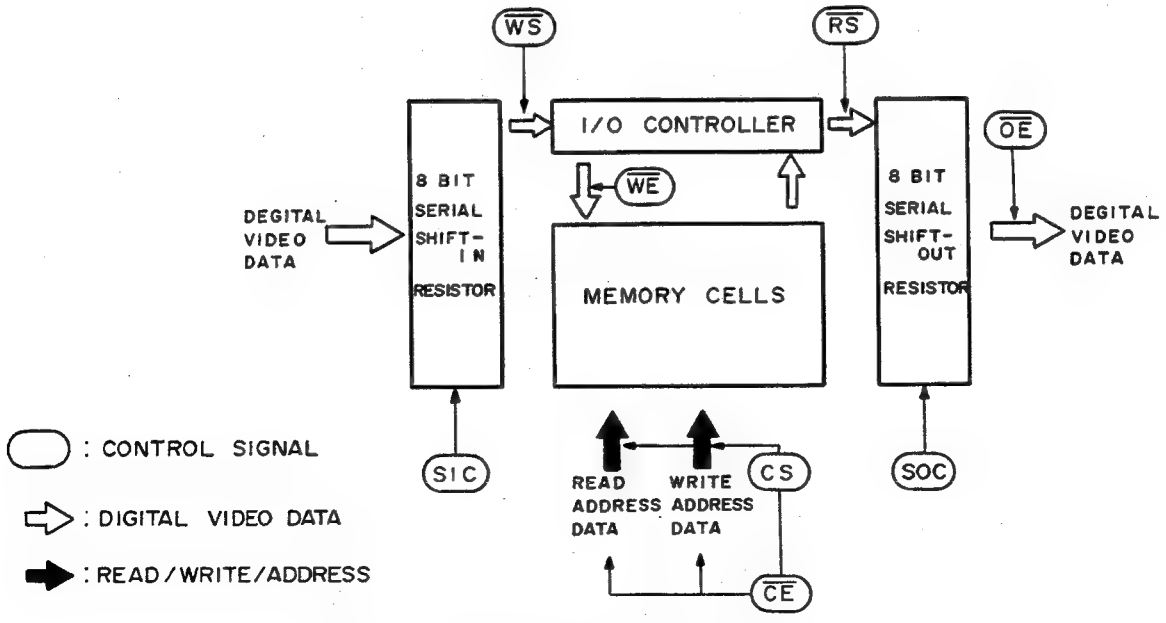


Fig. 1-8 Block diagram of frame memory IC

- CS, $\overline{OE}$

  As described previously, the KM-F250 uses two frame memory ICs for 1 field and four ICs for 1 frame. When writing or reading data, it is necessary to call up a specific memory IC for each field. The CS and $\overline{OE}$ signals are used for the selection of these memory ICs.

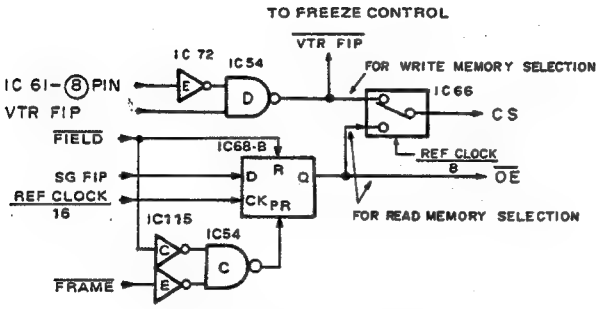


Fig. 1-9 CS/$\overline{OE}$ generator

*OE: Output enable signal which selects the memory IC from which data is to be read. In normal operation, "R" and "PR" terminal of IC68-B are high, and $\overline{OE}$ = SG-FIP. SG-FIP is a field detection pulse which is generated by the SSG in the KM-F250. This pulse goes low when it is odd and goes high when it is even, and the corresponding memory IC is selected. When the field freeze mode is selected on the front panel, the $\overline{\text{FIELD FREEZE}}$ signal goes low, and $\overline{\text{FRAME FREEZE}}$ goes high so that IC68-B becomes RESET mode, and the $\overline{OE}$ signal is fixed at low. At this time, an odd field memory IC is selected.

*CS: Chip select signal. The write memory and read memory are selected and switched using a signal counted-down to 1/8 from the REF CLOCK signal. The read memory IC is selected by the $\overline{OE}$ signal, and the write memory IC is selected by the VTR FIP signal. The VTR FIP signal is a VTR playback signal field index pulse and is produced from the VTR CLOCK signal described later. This pulse goes high when it is odd and goes low when it is even. When the VTR is in the playback mode, the signal at pin 8 of IC61 is fixed at low; therefore, the VTR FIP signal is inverted by IC54 and used as the CS signal. The signal from pin 8 of IC61 clears the data remaining in the memory when the VTR stops playback. When the VTR stops playback, the VTR FIP signal is fixed at high and the level at pin 8 of IC61 is switched from low to high 4 msec after the VTR is stopped. At this time, the CS signal also changes, and the video data remaining in both the odd and even memories immediately before the VTR is stopped is overwritten by pedestal level data. This clears the memories.

5) Memory write and read operations

Write and read operations are performed simultaneously. The write address and read address data are selected alternately by the signal counted down to 1/8 the REF CLOCK signal, and written to the frame memory IC. This selection is switched in accordance with the timing of the $\overline{WE}$ signal. While the $\overline{WE}$ signal is low, the write address is selected whereas, while it is high, the read address is selected.

- Write operation (see ① and ② in the illustration below)

  *The moment the $\overline{WS}$ signal falls, the data 8 SIC cycles before it falls is written from the shift-in register to I/O controller in the frame memory IC, then it is latched . . . . . ①

  *Immediately after it is latched, the $\overline{WE}$ signal goes low, then the $\overline{CE}$ signal goes low and the write address and CS signal are fetched . . . . . ②

  *At this time, if the CS signal is high, data is stored in the address from which the latched data has been fetched by $\overline{CE}$ signal, and the write operation is completed.

- Read operation (see ⚠1 and ⚠2 in the illustration below)

  *While the $\overline{WE}$ signal is high, the $\overline{CE}$ signal goes low, and the read address and CS signal are fetched . . . ⚠1

  *At this time, if the CS signal is high, data is obtained from the address from which it has been written using the $\overline{CE}$ signal at the trailing edge of the $\overline{RS}$ signal. This data is latched by the shift out register within the frame memory IC . . . . . ⚠2

  *If the $\overline{OE}$ signal goes low immediately after latching, the data is output from the frame memory IC at 8 SOC cycles, and the read operation is completed.. . ⚠3

  The video data obtained in this way is locked to the reference signal and is free from jitter. This data is then transferred to the post-1H buffer.

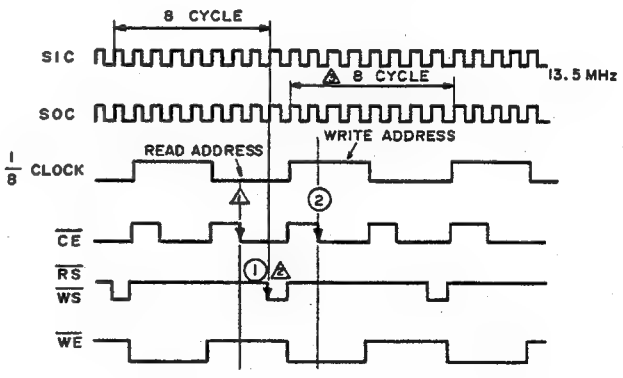
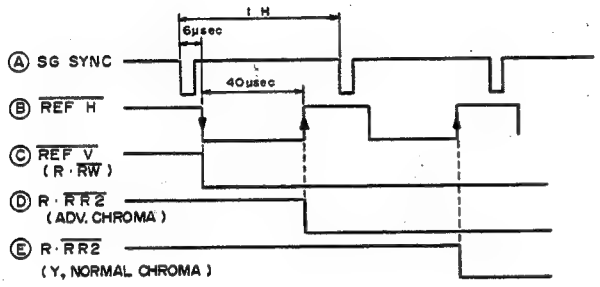


Fig. 1-10 Timing chart of frame memory control

(5) Post-1H buffer

The video data read from the frame memory IC is immediately written to the Post-1H buffer. The written data is read with the timing of the REF SYNC signal generated by the SSG inside the KM-F250, then sent to the circuit in the next stage. In this way, the post-1H buffer locks the data from the frame memory using the REF SYNC signal.



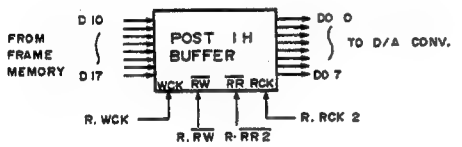


Fig. 1-11 Post-1H buffer

This circuit also functions as the chroma advance circuit which advances phase of C signal 1H ahead that of Y signal.

The post-1H buffer is a DRAM as same as the pre-1H buffer, but its capacity is 5048 x 8 bits.

Write and read are performed using R. WCK and R. RCK2 locked to the REF CLOCK signal. The read timing is shown in Fig. 1-11.

R. $\overline{RW}$ Ⓒ and R. $\overline{RR2}$ Ⓓ, Ⓔ are start signals for write and read, which are respectively generated every one V. period. Since these signals reset the address inside the buffer at the same time of the start, the points to start reading and writing of data coincide with each other. The start point of data is approx. 6 μsec later than that of REF SYNC Ⓐ . R. $\overline{RW}$ is $\overline{REF\ V}$ itself. R. $\overline{RR2}$ is generated at rise of $\overline{REF\ H}$ Ⓑ and its phase is delayed 1H from R. $\overline{RW}$ both for Y and C signals. (IC103-A/B is the 1H delay circuit.) However, when the ADV. CHROMA switch of the memory circuit board is turned on, only the R-$\overline{RR2}$ for Y signal is delayed 1H, while R. $\overline{RR2}$ for C signal is generated at the normal timing Ⓓ . As a result, phase of C signal is advanced 1H, and this avoides color phase difference caused by the comb filters inside VTR or monitor.

(6) Negative/positive select circuit

When the NEGA button is pressed on the RM-P250 (remote control unit), the data read from the post-1H buffer is inverted and a negative video image is produced. IC75 includes exclusive-OR gates. Normally (positive), the $\overline{NEGA}$/POSI signal is high, and the input data is output as it is. If the NEGA button is pressed on the RM-P250, the $\overline{NEGA}$/POSI signal goes low, and the input data is inverted before being output. The data which has passed through this circuit is transferred to the blanking mix circuit.

Fig. 1-12

(7) Blanking mix circuit

This circuit performs blanking mix for both negative and positive data; however, its primary purpose is to perform blanking processing for negative data.

During the blanking period, it is switched over to the pedestal level data position by the C. BL pulse from the SG circuit board, whereby blanking processing is performed. The data subjected to blanking processing is sent to the D/A converter.

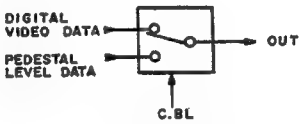


Fig. 1-13

(8) D/A converter

The 8-bit video data is converted into an analog signal, then restored to a video signal. The clock signal used is the REF CLOCK signal.

The Y signal converted back into an analog signal is passed through Q7, then sent to the output process circuit on the VIDEO circuit board as TBC Y.

The C signal is converted into analog signal using separate D/A converters for the R-Y signal and B-Y signal. As described in 1.1.5-1.(2), as the R-Y and B-Y signals are alternately A/D-converted, here the signals are alternately D/A-converted, one clock at a time.

The separated and converted R-Y and B-Y signals are passed through buffers Q8 and Q9 respectively, then sent to the output process circuit on the VIDEO circuit board as TBC R-Y/TBC B-Y in the same way as the Y signal.

2. Control signal block

The control signals to be used by the MEMORY circuit board are classified into two types.

First, there are the control signals which are locked to the VTR playback signal. These contain jitter components inherent in the VTR signal and are mainly used for processing data before it is written to the frame memory.

The other type of control signals are locked to the reference signal generated by the SG circuit board in the KM-F250. These are used for the processing of data in the frame memory up to the output from the MEMORY circuit board.

(1) Control signals locked to the VTR signal

The control signals locked to the VTR signal are further classified into two types. One type of control signals are generated by directly processing the VTR SYNC signal produced by the VIDEO circuit board. The other type of control signals are generated by the VTR CLOCK signal obtained by locking the VTR SYNC signal to the 13.5 MHz VCO.

1) VTR SYNC

A system diagram of the signals generated from the VTR SYNC signal is shown in Fig. 1-14.

- H. SYNC detection circuit

  The H. SYNC detection circuit prevents malfunctions due to noise, etc. This circuit consists of IC18-A/B and IC20-A/B. As the VTR playback signal is subjected to extreme degradation and does not necessarily coincide with the normal signal, the signal with a pulse width of 3.3 μsec to 5.6 μsec is detected as the VTR SYNC signal.

  When the VTR SYNC signal is input from the VIDEO circuit board, the following signals are generated.

*$\overline{\text{VTR V}}$: VTR SYNC signal from the SYNC detection circuit is input to the integrating circuit (R126, R129, C116, C117 and IC37) to obtain V. SYNC, which is delayed 1 VTR H by IC22-B and IC23-B to be this $\overline{\text{VTR V}}$ signal. This is used as V. RESET signal of the address counter to write frame memory.

*$\overline{\text{VTR FIP}}$: This is a field index pulse. It goes high for odd fields and low for even fields. It switches for every field, locked to the $\overline{\text{VTR V}}$ signal. If the input signal is absent, it is fixed at high by the $\overline{\text{NO VIDEO}}$ signal. This signal is used as the CS signal for the frame memory.

*VTR H PLL CTL (Q, $\overline{\text{Q}}$): This signal is generated just after H. SYNC all the time except V. SYNC period. This is used as control signal of the VTR H PLL circuit.

- Clamp pulse

  This is a positive-going pulse which is generated by inputting the VTR SYNC signal to a monostable multivibrator.

*Y CP/C CP: These are used to clamp the video signals the moment they are input to the MEMORY circuit board. The Y CP signal clamps the VTR Y signal whereas the C CP signal clamps the VTR R-Y and VTR B-Y signals.

When input signal from VTR is interrupted, a monostable multivibrator IC7-B detects it and switches sync signal from VTR SYNC to SG SYNC to generate clamp pulse. This avoids fluctuation of pedestal signal even in the condition with no signal input.

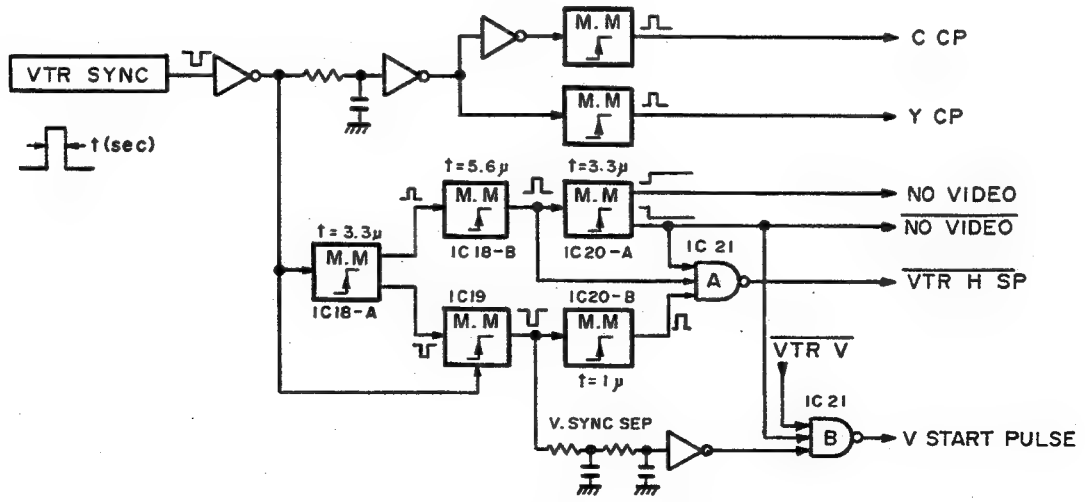


Fig. 1-14 System diagram of VTR SYNC

2) VTR CLOCK

The VTR CLOCK signal is used as the select signal of the C (chroma) signal multiplexer, the clock signal of the A/D converter, the control signal of the pre-1H buffer and for the generation of the H reset signal of the frame memory write address counter and for field detection. The VTR CLOCK signal is locked to the VTR SYNC signal by the H. PLL circuit.

- Generation of the VTR CLOCK signal

  The VTR CLOCK oscillator is generated with a frequency of 13.5 MHz using the VCO consisting of IC30-C, L9, C49 and D11. A system diagram of the signals generated from the VTR CLOCK oscillator is shown in Fig. 1-15.

  The roles of these signals are described later (Article: Signals produced from the VTR CLOCK signal).

- VTR H PLL (phase locked loop)

  In this circuit, the VTR CLOCK signal is locked by the VTR SYNC signal. Because of this, the VTR CLOCK signal will contain the same jitter components as the VTR SYNC signal.

  APC IC12 compares phases of H-periodic signal ($\overline{\text{VTR H}}$) obtained by dividing VTR CLOCK signal into 858 and H-periodic pulse synchronized with VTR SYNC signal. The resultant signal after the phase comparison is supplied to the 13.5 MHz VCO to match the phases. At the same time, the VCO receives a voltage which H pulse synchronized with VTR SYNC is integrated by R28 and C82. As a result VTR CLOCK pulse synchronizing with frequency fluctuation of VTR SYNC signal is obtained since the supply voltage is proportioned to the duty ratio of the H pulse.

VTR H PLL CTL ($\overline{Q}$) produced from VTR SYNC signal is input to IC84-B and IC13-A to form the pulse whose rise timing and waveform width are adjusted. Timing of the rise can be adjusted by the H POSITION VR on the escutcheon of the memory circuit board. This pulse is input to pin 8 of IC12 for phase comparison with that of $\overline{\text{VTR H}}$ input to pin 7 via IC27-B.

IC27-B functions in input control of IC12, namely, it arranges the input order of the pulses to pins 8 and 7 so that pin 8 is everytime for the first. Besides this function, if there is no input to pin 8, it interrupts input to pin 7. This prevents erroneous operation of the APC in case of VTR SYNC dropout.

The resultant signal (PD) from IC12 is impressed to the VCO for a time corresponding to the phase difference (equivalent to pulse width of the phase output) as far as VTR H PLL CTL (Q) is generated. All these functions are controlled by IC84-A and IC26-C.

To avoid large variation of VCO voltage in such a case as the APC is activated owing to noise, etc., IC26-D switches impressed voltage to the VCO so that it impresses it with the control voltage for a semi-period of $\overline{\text{VTR H}}$ and for the other half average voltage before the control is impressed.

The VTR CLOCK pulse generated as mentioned above has the same jitter component as that of VTR SYNC signal.

The phase of the $\overline{\text{VTR H}}$ is set by the H POSITION VR.

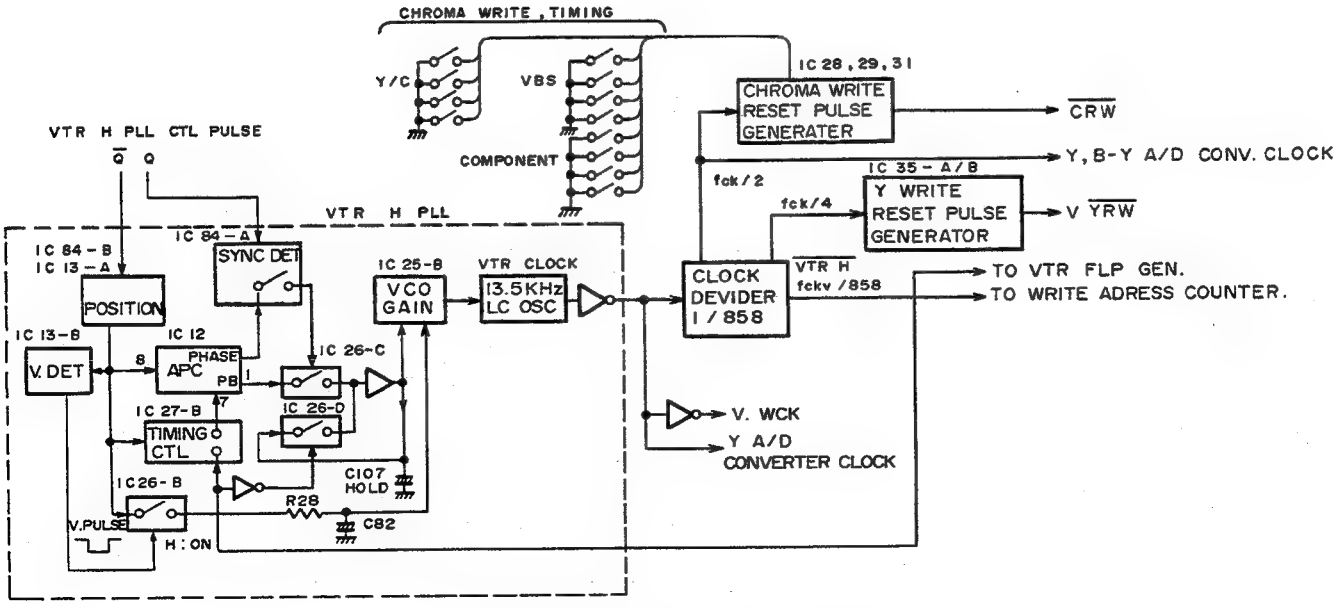


Fig. 1-15 System diagram of VTR CLOCK

- Signals produced from the VTR CLOCK signal
  Refer to the system diagram given in Fig. 1-15.

  *$\overline{\text{VTR H}}$: This is an H period signal whose width is adjusted by the flip-flop after the VTR CLOCK is counted down to 1/858. It is used as a sync signal for the $\overline{\text{VTR V}}$ signal and H reset signal for the frame memory write address counter.

  *A/D converter clock: This signal is sent to the A/D converter.

  *V WCK: This is the write clock signal for the pre-1H buffer.

  *V $\overline{\text{YRW}}$: This is the write start signal for the Y signal pre-1H buffer. This signal is generated with the timing of the leading edge of the signal 180° out-of-phase from the $\overline{\text{VTR H}}$ signal. The pulse width is adjusted to be the same as that of the VTR CLOCK signal by the flip-flop.

*V $\overline{\text{CRW}}$: This is the write start signal for the C signal pre-1H buffer. This signal is generated delayed by a few μsec with respect to the YRW signal. This is to correct the timing deviation between the Y signal and C signal which occurs during the process in which the signal is converted into the component signals (VTR Y/VTR R-Y/VTR B-Y) at the input process or on the VIDEO circuit board and during the process in which the K factor is adjusted.

Since this timing deviation differs slightly depending on the three signal formats, the delay time is adjusted for each format using SW3 and SW5. This delay time is selected by the INPUT SELECT signal.

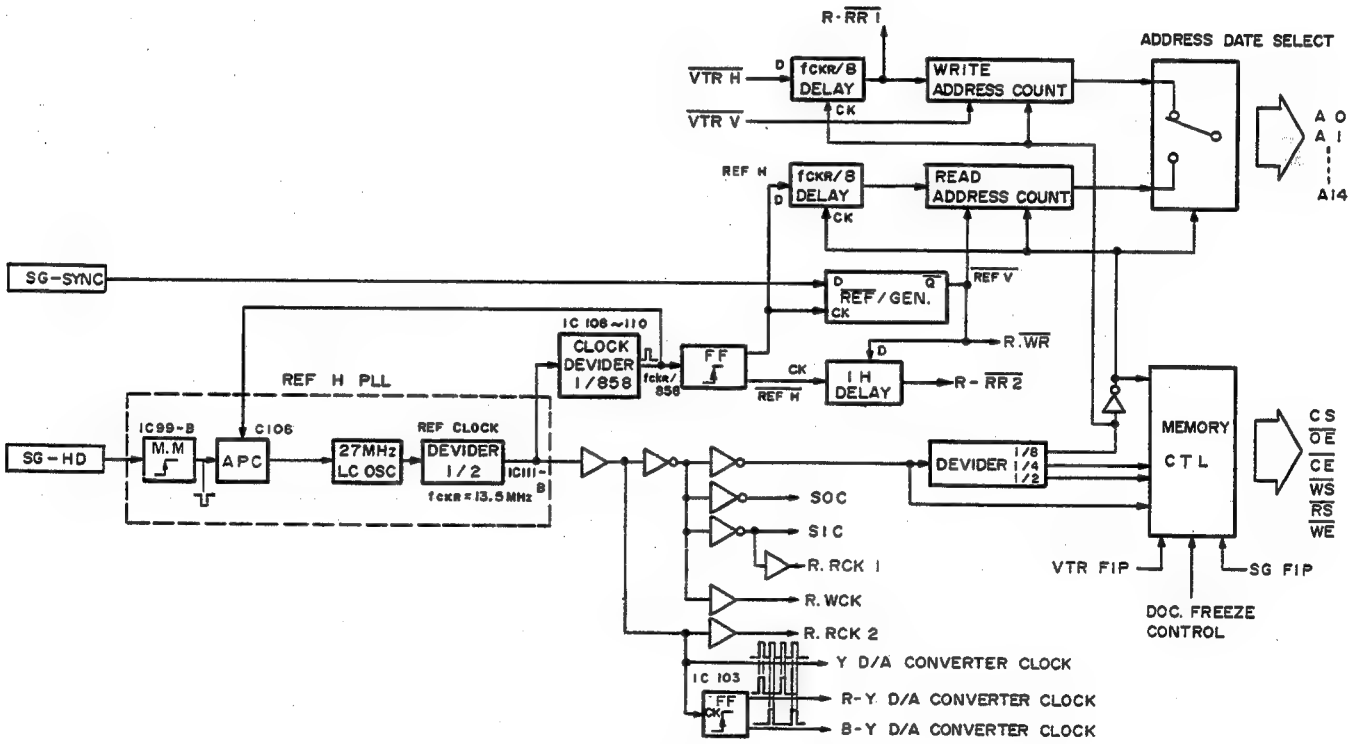


Fig. 1-16 System diagram of REF CLOCK

(2) Control signals locked to the internal reference signal

The control signals are produced using the 13.5 MHz REF CLOCK as a reference signal.

The system diagram of the REF CLOCK signal is shown in Fig. 1-16.

1) REF CLOCK

The REF CLOCK signal is produced by counting down to 1/2 the 27 MHz output from the VCO consisting of IC114-C, L8, C113 and D9 using IC111-B. The REF CLOCK signal is locked to the SG-HD signal produced by the SG circuit board using the H PLL circuit. The operation of the REF H PLL circuit is basically the same as that of the VTR H PLL circuit described previously.

2) Signals produced from the REF CLOCK signal

- Signals used for the pre-1H buffer
  - *R RCK1: This is the data read clock pulse.
  - *R $\overline{\text{RR1}}$: This is the data read start pulse. (Its period is locked to the leading edge of the $\overline{\text{VTR H}}$ signal. Its width is made equal to 8 REF CLOCK pulses using the flip-flop.)
- Signals used for frame memory control
  - *SIC, SOC, $\overline{\text{CE}}$, $\overline{\text{RS}}$, $\overline{\text{WS}}$, $\overline{\text{WE}}$, CS, $\overline{\text{OE}}$: Refer to the section describing the frame memory, 1.1.5-1(4).
- Signals used for the generation of the frame memory read address data
  - *REF H: This is an H period signal which is obtained by counting down the REF CLOCK signal to 1/858, then the pulse width is adjusted using the flip-flop. It is used for H resetting the read address data.
  - *$\overline{\text{REF V}}$: This is used for V resetting the read address data. This pulse is obtained by detecting the V SYNC portion of SG SYNC using REF H timing.
- Signals used for the post-1H buffer
  - *R RCK2: This is the data read clock pulse.
  - *R WCK: This is the data write clock pulse.
  - *R $\overline{\text{RR2}}$: This is the data read start signal. It is locked to the leading edge of $\overline{\text{REF H}}$ (inverted REF H). Its pulse width is counted up by a factor of 2 REF CLOCK using the flip-flop.
  - *R $\overline{\text{RW}}$: This is the data write start pulse. This pulse is locked to the leading edge of the REF H signal.
- Signal used for the clock of D/A converter

  As the clock for the D/A converter of the Y signal, the REF CLOCK is used as it is. For the C signal, one REF CLOCK at a time is sent alternately to separate D/A converters for the R-Y signal and B-Y signal via flip-flop IC83-B.

3. Other circuits

(1) DOC circuit (dropout compensation circuit)

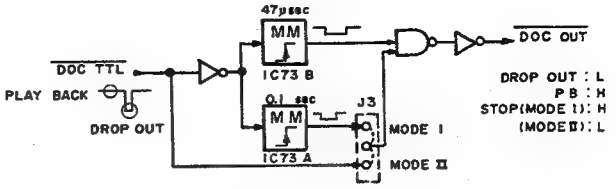


Fig. 1-17 DOC circuit

If there is dropout in the VTR RF signal input from the DOC input on the rear panel, it is detected by the VIDEO circuit board, and the $\overline{\text{DOC TTL}}$ signal is output. The MEMORY circuit board receives this and the $\overline{\text{DOC OUT}}$ signal is generated so that the picture is set to the FRAME FREEZE mode when dropout has occurred. The DOC circuit has the following two modes, which can be selected by switching J3 on the MEMORY circuit board.

1) Mode 1

When $\overline{\text{DOC TTL}}$ is input, a $\overline{\text{DOC OUT}}$ pulse with a pulse width of 0.1 sec is output by IC73-A. This $\overline{\text{DOC OUT}}$ pulse is sent to the FREEZE control circuit to set the picture to the FRAME FREEZE mode. Unless the $\overline{\text{DOC TTL}}$ pulse is input again, the normal screen is resumed after 0.1 sec.

2) Mode 2

When the $\overline{\text{DOC TTL}}$ pulse is input, a $\overline{\text{DOC OUT}}$ pulse with a pulse width of 47 μsec is output by IC73-B, setting the picture to the FRAME FREEZE mode. When no further $\overline{\text{DOC TTL}}$ pulse is not input, the normal screen is restored after 47 μsec.

In either mode, dropout compensation during the playback of the VTR is the same except that the freeze time is different. However, dropout compensation operation when the VTR is in the stop mode is different. In the case of mode 1, the picture immediately before stop is frozen for 0.1 sec before the no-signal state is output.

In the case of mode 2, the picture immediately before the stop is kept frozen until the next picture is input.

(2) FREEZE control circuit

The FREEZE effect is obtained by inhibiting writing to the frame memory by making the $\overline{\text{WE}}$ pulse high.

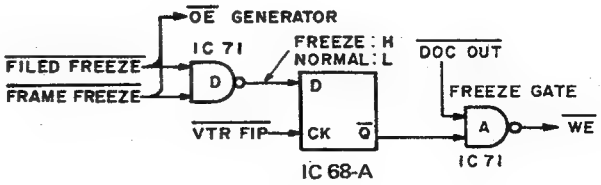


Fig. 1-18

1) FIELD FREEZE

When the FIELD button on the front panel is pressed, the $\overline{\text{FIELD FREEZE}}$ signal goes low, making the IC71-D gate output high. IC68-A reads data from the CS signal generator at the leading edge of $\overline{\text{VTR FIP}}$ signal and makes output $\overline{Q}$ low. The $\overline{\text{DOC OUT}}$ of the FREEZE gate is high during normal playback; therefore, the gate output ($\overline{\text{WE}}$) goes high. When the $\overline{\text{WE}}$ output goes high, writing to the frame memory is inhibited and only reading becomes possible. As until new data is written, the same data continues to be read, the mode enters the FREEZE mode. At this time, as the $\overline{\text{FIELD FREEZE}}$ signal holds the $\overline{\text{OE}}$ signal low, only the odd field data is read.

2) FRAME FREEZE

If the FRAME mode is selected on the front panel, the $\overline{\text{FRAME FREEZE}}$ signal goes low, making the gate IC71-D output high. The subsequent operation is the same as that in the FIELD FREEZE mode.

However, this has no influence over the $\overline{\text{OE}}$ signal, both odd and even field data are read alternately, and the FRAME FREEZE mode is entered.

(3) Generation of the ADV SYNC

The ADV SYNC signal servo-locks the VTR. As the KM-F250 is a frame synchronizer, this signal is not normally used.

However, in the time code editing process, it may be necessary in some cases. The ADV SYNC signal is generated by the MEMORY circuit board and is output from the rear panel. The phase of this signal leads that of the REF SYNC signal output from the internal SSG by 4H or 8H. Switching between 4H and 8H is done using connector J1 on the MEMORY circuit board.

The block diagram of the ADV SYNC signal generation circuit is shown in Fig. 1-19.

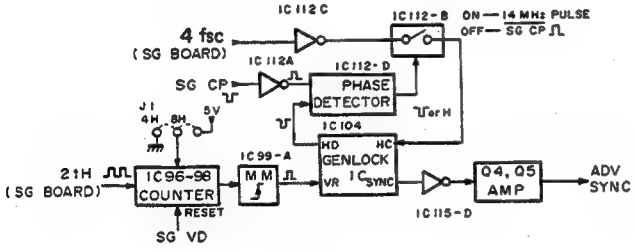


Fig. 1-19

The binary counter (IC96 to IC98) counts up the 2fh signal from the SG circuit board, then its output is fed to the monostable multivibrator (IC99-A), and a V reset signal with the V period and a width of 3H is produced. This V reset signal leads in phase with respect to the V start timing of the REF SYNC signal. The V reset signal is input to IC104. IC104 is the same 44-pin IC used in the SSG on the SG circuit board and outputs the C SYNC signal with its timing matched to that of the V reset signal. This output is passed through amplifiers Q4 and Q5 before becoming the ADV SYNC signal.

The H period of IC104 is locked to the 4 fsc signal from the SG circuit board. At this time, the phase difference between the HD signal (output from IC104) and the CP signal fed from the SG circuit board is detected by IC112-D; if these signals are in phase, the output from IC112-D goes high and the 4 fsc signal is input to IC104. If they are not in phase, the SG-CP signal is output with its existing timing and the 4 fsc signal goes high during the SG-CP period.

(4) 5.36 MHz oscillator

The 5.36 MHz signal produced here is used by the chroma down-converter in the output processor of the VIDEO circuit board.

The circuit consisting of X1, IC113, etc. is the 5.36 MHz signal OSC. This circuit does not activate otherwise outputting the Y/C924 signal to prevent noise interference. The output from the OSC is wave-shaped using ceramic filter CK1, then passed through buffer Q6 before being fed to the VIDEO circuit board.

(5) VIDEO LEVEL detector circuit

The video signal level is detected by integrating bit 7 and bit 8 of the Y signal data produced by the A/C converter.

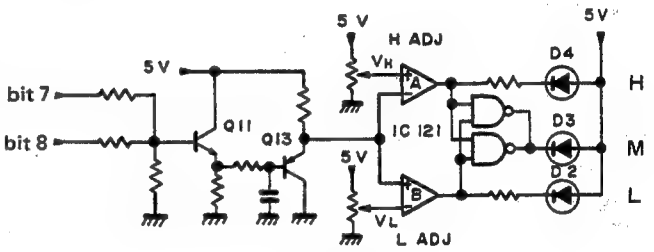


Fig. 1-20

The integrated voltage is compared using the window comparator, the output of which is used to light the LEDs.

The LEDs which light are selected depending on the relation between emitter voltage Ve of Q13 and VH (high) or VL (low) of the window comparator output.

1. Ve < VL < VH : D2 (L) lights
2. VL < Ve < VH : D3 (M) lights
3. VL < VH < Ve : D4 (H) lights

When both bit 7 and bit 8 are low, it corresponds to 1 above, when either is high, it corresponds to 2, and if both are high, it corresponds to 3.

(6) Generation of OPERATE/$\overline{\text{BY PASS}}$, $\overline{\text{FIELD}}$ and $\overline{\text{FRAME}}$ signals

These signals are produced by triggering a D flip-flop IC. The trigger pulse is generated by pressing front panel buttons. When power is switched on, due to the operation of IC20, these ICs are reset to the initial state, and inverted every time their buttons are pressed. The initial state of each signal and its destination are as follows.

*OPERATE/$\overline{\text{BY PASS}}$ (IC118-A)

$\overline{Q}$ output: Goes high. At this time, the moment the LED in the OPERATE/BY PASS button is lit (it shows OPERATE mode), the switching relay in the RL circuit board is driven.

*$\overline{\text{FIELD FREEZE}}$ (IC119)

Q output: Goes low. When the FIELD button is pressed, it goes high, and the LED in the button is lit.

$\overline{Q}$ output: Goes high. When the FIELD button is pressed, it goes low and the $\overline{\text{FRAME FREEZE}}$ is forcibly pulled high. This signal is sent to the FREEZE control circuit and $\overline{OE}$ generator.

*$\overline{\text{FRAME FREEZE}}$ (IC118-B)

Q output : Goes low. When the FRAME button is pressed, it goes high and the LED in the button is lit.

$\overline{Q}$ output: Goes high. When the FRAME button is pressed, it goes low, and the $\overline{\text{FIELD FREEZE}}$ signal is forcibly pulled high. This signal is sent to the FREEZE control circuit.

1.1.6 SG circuit board

The circuit configuration of the SG circuit board is basically the same as the SG circuit board built into KY-950B/KY-320B video cameras. However, electrical parts and the circuit board itself are different and they are not compatible.

The SG circuit board has basically two functions: the SSG section generates various sync signals and the GENLOCK portion performs genlocking.

1. SSG section

As an SSG IC, a CMOS-structured 44-pin flat pack IC is used. There are two clock oscillators which generate H and V sync signals: 4 fsc clock oscillator and 910 fh clock oscillator. These are used to provide external sync.

In the case of the internal sync mode, as the H and V sync pulses are produced by counting down the 4 fsc signal, interleaved sync signals can be obtained.

In the external genlocking mode, these clock oscillators are phase-controlled by the external SC and external SYNC pulses respectively.

(1) Sync signal pulses

The timing chart of primary sync signals output from the SG circuit board is given on the following page.

The sync signals output from the SSG are as follows.

1) SG-SC signal

Sent to the chroma signal generation circuit on the VIDEO circuit board.

2) SG-BFP pulse

Sent to the chroma signal generation circuit, Y output driver circuit and input clamp section of the B.B. (BLACK BURST) signal generation circuit of the output process section on the VIDEO circuit board.

3) SG-CP pulse

Sent to the chroma signal generation circuit, and input clamp section of the R-Y and B-Y output driver circuits of the output process section of the VIDEO circuit board. This signal is also sent to the ADV SYNC generation circuit on the MEMORY circuit board.

4) SG-SYNC pulse

Sent to the REF SYNC output driver circuit and sync mix circuit with the TBC Y signal of the output process section on the VIDEO circuit board.

5) SG-C, BL pulse

Sent to the processing circuit of the MEMORY circuit board which performs blanking using output of the post-1H buffer IC at the output stage of the memory.

6) 4 fsc signal

Sent to the ADV SYNC generation circuit on the MEMORY circuit board.

7) 2 fh pulse

Sent to the ADV SYNC generation circuit on the MEMORY circuit board.

8) SG-FIP pulse

Sent to the odd/even memory select signal (CS, OE) generation circuit when calling up data from the frame memory IC on the MEMORY board.

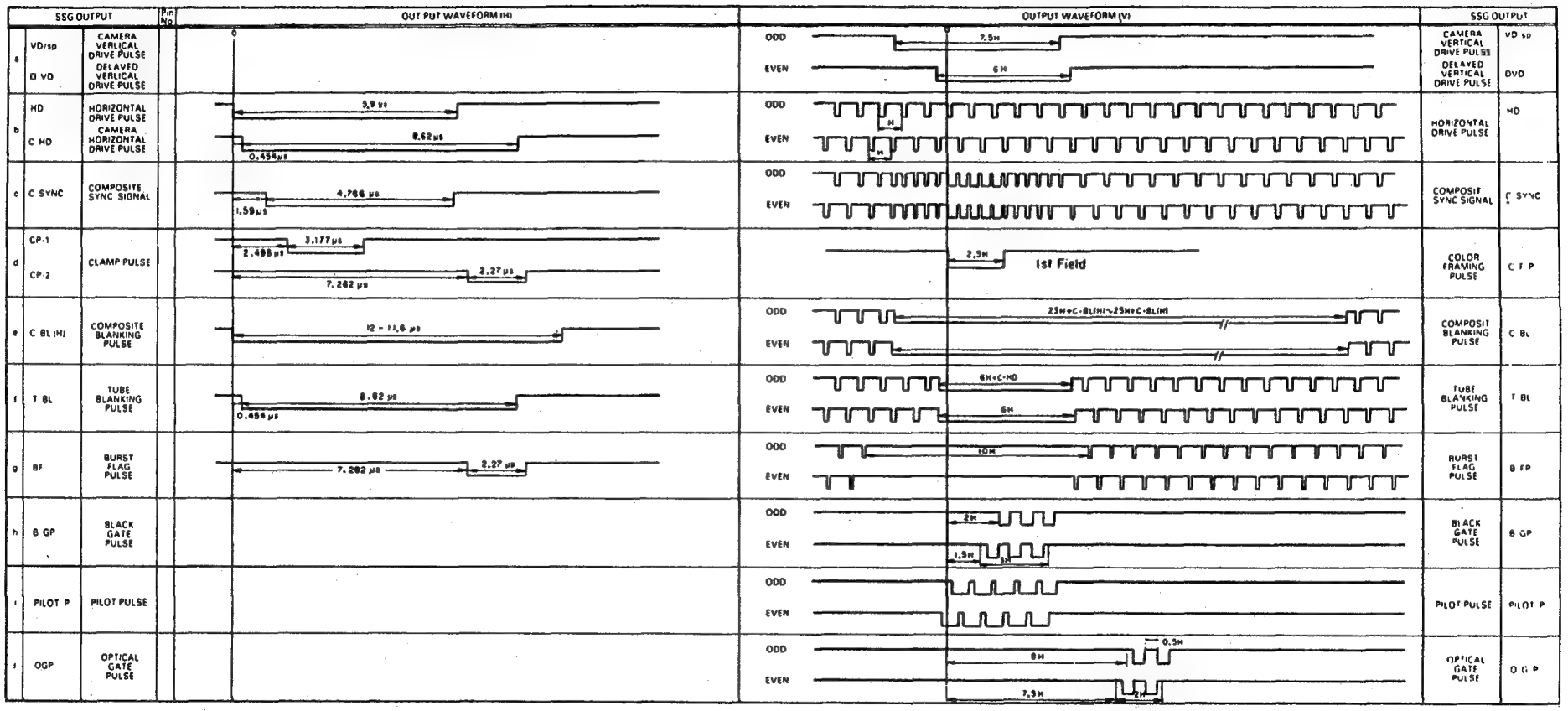

SSG OUTPUT
Pin No
OUT PUT WAVEFORM (H)
OUTPUT WAVEFORM (V)
SSG OUTPUT
a
VD/sp
CAMERA VERLICAL DRIVE PULSE
D VD
DELAYED VERLICAL DRIVE PULSE
ODD
EVEN
7.5H
6H
CAMERA VERTICAL DRIVE PULSE
VD sp
DELAYED VERTICAL DRIVE PULSE
DVD
b
HD
HORIZONTAL DRIVE PULSE
C HD
CAMERA HORIZONTAL DRIVE PULSE
3.9 µs
8.62µs
0.454µs
1H
HORIZONTAL DRIVE PULSE
HD
c
C SYNC
COMPOSITE SYNC SIGNAL
4.766 µs
1.59µs
COMPOSIT SYNC SIGNAL
C SYNC
d
CP-1
CP-2
CLAMP PULSE
3.177µs
2.486µs
2.27µs
7.262 µs
2.5H
1st Field
COLOR FRAMING PULSE
C F P
e
C BL (H)
COMPOSITE BLANKING PULSE
12 - 11.6 µs
25H+C-BL(H)~25H+C-BL(H)
COMPOSIT BLANKING PULSE
C BL
f
T BL
TUBE BLANKING PULSE
8.62 µs
0.454 µs
6H+C-HD
6H
TUBE BLANKING PULSE
T BL
g
BF
BURST FLAG PULSE
7.262 µs
2.27 µs
10H
BURST FLAG PULSE
B FP
h
B GP
BLACK GATE PULSE
2H
1.5H
3H
BLACK GATE PULSE
B GP
i
PILOT P
PILOT PULSE
PILOT PULSE
PILOT P
j
OGP
OPTICAL GATE PULSE
0.5H
8H
7.5H
2H
OPTICAL GATE PULSE
O G P

Fig. 1-21

9) SG-HD pulse

Sent to the REF H-PLL (H-phase-locked-loop) circuit on the MEMORY circuit board in order to lock the reference 13.5 MHz clock pulse with this SG-HD pulse.

Also used for the PILOT BURST generator circuit for chroma down-converter on the VIDEO circuit board.

10) SG-VD pulse

Used for the generation of the ADV SYNC signal on the MEMORY circuit board, and sent to the READ address control signal generation circuit to call up data.

Also used for the generation of HEAD SW pulse for 5.06 MHz carrier generator on the VIDEO circuit board.

2. GENLOCK section

The SSG is genlocked with the black burst or composite video signal supplied from an external reference source. A stable reference signal is necessary, so the playback signal of a VTR can not be used since it contains too much jitter and generates synchronizing noise around the switching point.

Especially in this SSG, as an oscillating crystal is used in synchronizing oscillator, it is not synchronized with the VTR signals.

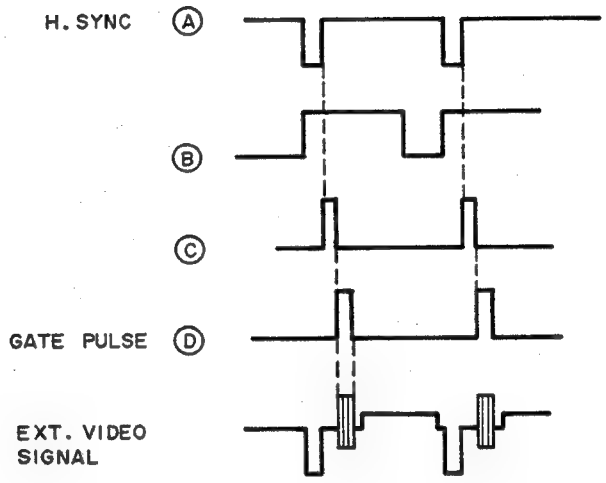


Fig. 1-23

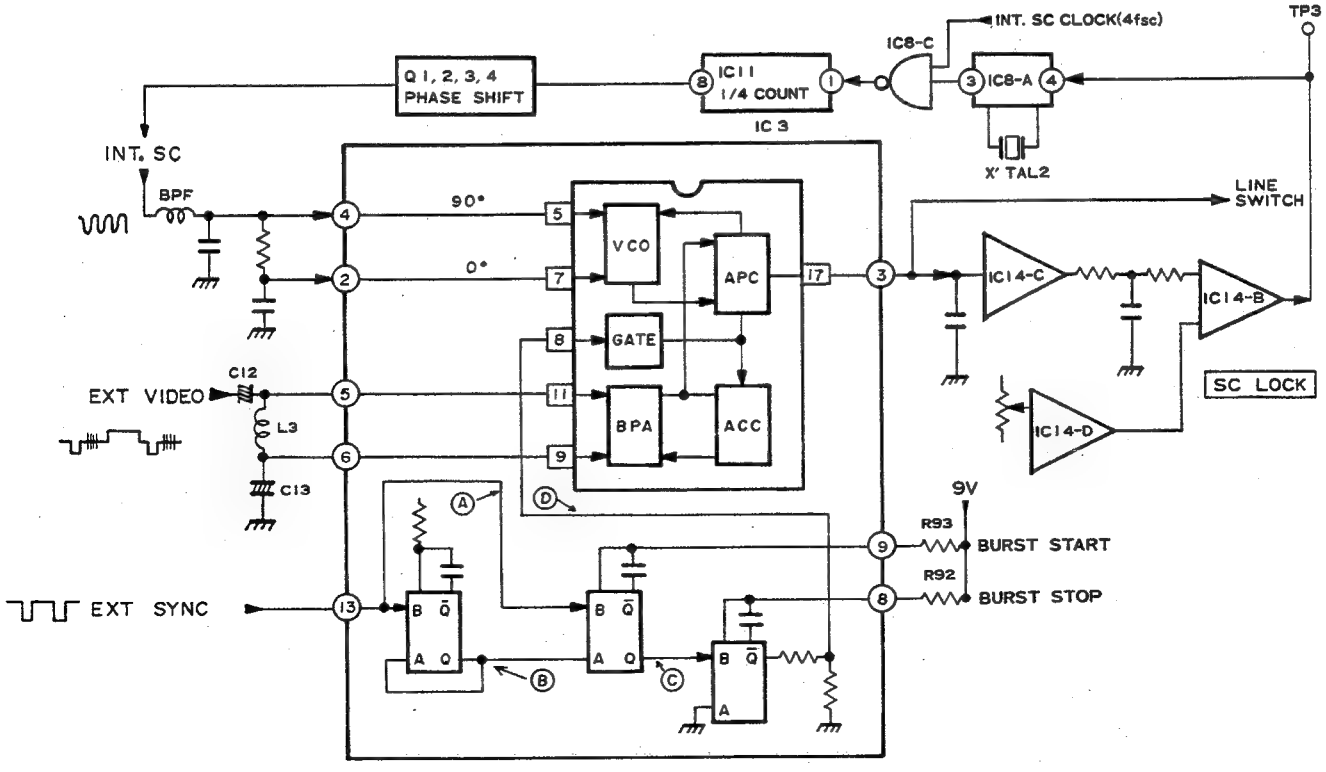


Fig. 1-22 SC lock loop

(1) Subcarrier phase

The composite synchronizing signal (Black burst or composite video signal) enters terminal ⑱ on the SG PCB. The emitter output of buffer IC16 enters SC filter C12, L3 and the SG element enters pins ⑤ and ⑥ on the phase comparator IC13. The SC is applied to pin ④ by the internal oscillator through IC11.

The gate pulse to extract the burst subcarrier is produced by shaping H-sync, which is obtained by synchronizing separation (IC16, 17) of the external reference signal.

When comparing both phase of INT. SC and EXT. SC inside IC13, the phase difference comes to output pin ③ as an error ripple. This ripple is applied to each VCO of X'TAL 2 and IC14 (the control amplifier), and performs control so that the 4 fsc oscillation phase will be equal to EXT. SC.

(2) H-sync phase

The H-sync pulse synchronously separated from IC16 and IC17 becomes the fixed width H pulse by the monostable F.F. in the IC3.

This H pulse produces a sawtooth wave with the integrating circuit of R35, C21.

Its DC bias is variable using R72 H-PHASE.

The HD pulse produced by the internal oscillator (H-CLOCK OSC. IC7-D generates the synchronizing pulse) is shaped to the H pulse for phase comparison by IC4. In IC12, the phase detection of two signals is performed by the method shown in Fig. 2-9-7, and the phase difference signal is output from pin 15. Phase difference pulse passes through L.P.F., and is amplified at IC13-A. The output of IC13-A controls the clock frequency (282 fh). Since the clock oscillator of crystal oscillator is frequency-controlled, jitter is extremely minimized while the control range is narrow.

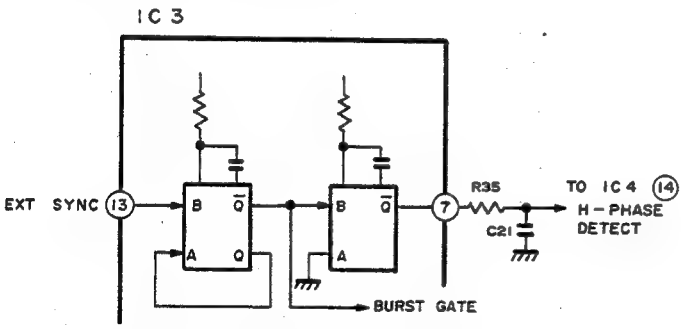


Fig. 1-24 Monostable IC in IC3

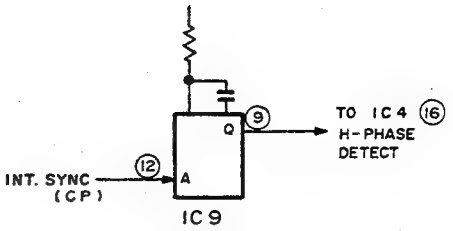


Fig. 1-25

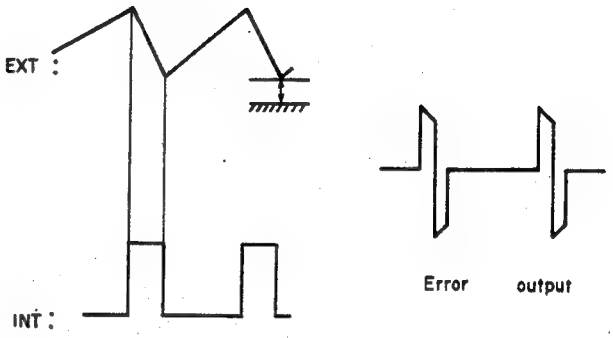


Fig. 1-26 H-phase error detection

(3) V-sync phase

The SSG LSI resets the vertical synchronizing phase. Phase equalization is performed by resetting pin 24 of the LSI with the V pulse separated from the external synchronizing signal (reset by the timing of the pulse drop).

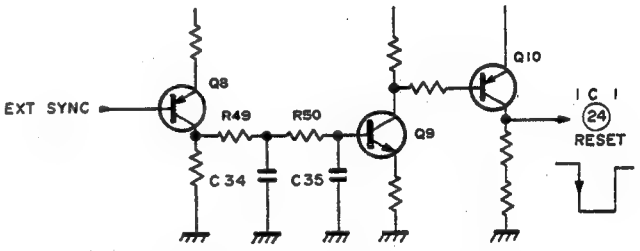


Fig. 1-27 Vertical synchronization reset

1.1.7 PS circuit board

The +12 V, −12 V and +5 V DC power supplies are produced on the PS circuit board and fed to the REG circuit board. The power supply uses a switching regulator.
As the +12 V and −12 V power supplies are used as main power supplies (in practice these are converted into +9 V and −9 V by the REG circuit board before being used), series regulations are used for both +12 V and −12 V power supplies as secondary regulators so that noise will not be introduced to the video circuits. TR1 is a switching FET, which is controlled by IC1-A.
The +5 V line voltage developed on the secondary side is detected by the IC1-B and IC1-A is controlled.

1.1.8 REG circuit board

The +9 V and −9 V power supplies are produced from the +12 V and −12 V generated by the PS circuit board and supplied to each board. The +5 V power fed from the PS circuit board is passed through this REG circuit board, then sent to the MT circuit board before being sent to each circuit board.

1.1.9 SUB carrier board

So that the H and SC phases can be adjusted from the front panel during genlocking, the controls and switches on the SG circuit board are moved onto this circuit board. The Y/C OUTPUT switch to be switched to correspond to the VTR connected to the Y/C OUTPUT terminal on the rear panel are also on the SUB circuit board. The Y/C OUTPUT switch provides contacts to the REG circuit board where the Y/C IN SELECT-A and Y/C OUT SELECT-B signals are generated.
The Y/C OUT SELECT signals are sent to the output processor on the VIDEO circuit board.

1.1.10 PB DET circuit board

As described in the section 1.1.4 - (4), when Y/C924 or Y/C627 signal is input to the KM-F250E, VBS signal is input for C signal together with Y signal. If a connected VTR is set to PB mode, phases of VBS and Y signal are the same, but if it is E-E mode, two phases may greatly differ from each other depending on a VTR used. Since the KM-F250E sets the start timing of FRAME MEMORY WRITE for both Y and C signals, the phase difference causes color phase irregularity.
Therefore, the PB DET board provided in the KM-F250E detects phase difference between Y signal and VBS to discriminate PB mode from E-E mode. The resultant signal is sent to the MEMORY and VIDEO circuit boards respectively to correct color phase irregularity.
Y/C627 or Y/C924 signal input to the Y/C INPUT on the rear panel is sent to the RL board via the PB DET board. Reaching the RL circuit board, the signal is also input to the SYNC-SEPA circuit inside the PB DET board. IC1 and IC2 are the SYNC-SEPA circuits for Y signal and VBS, respectively. Regarding the Y signal, it is sent to a double amplifier prior to IC1.

The SYNC-SEPA output appears at TP1 and TP2 as positive pulse.

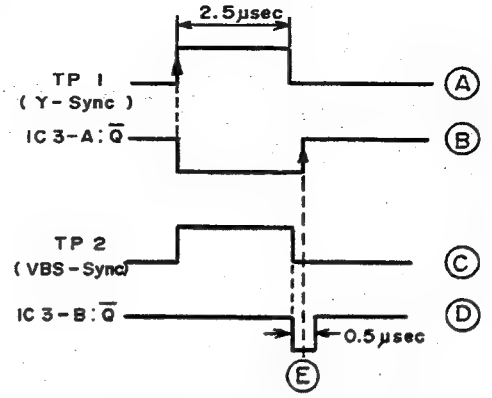


Fig. 1-28 Waveforms in PB mode

The pulse (VBS-sync Ⓒ) output from TP2 is supplied to the monostable multivibrator IC3-B for producing 0.5 μsec negative pulse (Ⓓ) which is synchronized with the trailing edge of the VBS-sync pulse.
On the other hand, the pulse (Y-sync, Ⓐ) output from TP1 produces negative pulse (Ⓑ) synchronizing with the rise edge of the Y-sync pulse. The pulse width is adjusted by R20 so that the produced pulse rises at the midpoint (Ⓔ) of the pulse produced from the VBS-sync.
The waveforms Ⓑ and Ⓓ (shown in the figure) become the CLOCK INPUT and DATA INPUT of the flip-flop IC4-A. Namely, the state of the waveform Ⓓ is read synchronously with rise of the waveform Ⓑ. As shown by Ⓔ in the figure, level in PB mode is "L", however, if either phase differs ±0.25 μsec or more from the other in E-E mode, the level becomes "H", which means that the phase difference is detected.
The detected result is supplied via R25 and C16 to IC5-A to be inverted and multiplied as DC component of SC which is input from the REG board. The multiplied signal is sent to the MEMORY and VIDEO boards together with the SC signal. R25 and C16 forms an integrating circuit which prevents the circuit from erroneous operation resulting from noise, etc.
Inside the MEMORY and VIDEO boards, the DC component of the supplied SC signal is separated to discriminate the mode; namely if its level is "H", the mode is PB, while "L" for E-E mode.
For a reference, the detection circuit of PB/E-E mode activates only in the mode with Y/C signal, otherwise it does not function being controlled by IC4-B and IC5-B, both of which are controlled with the INPUT SELECT-A signal.

SECTION 2
DISASSEMBLY

2.1 FUSE REPLACEMENT

Before replacing a fuse, the reason why it blew should be invested to prevent trouble from spreading. The malfunction should be repaired before replacing the fuse.

1. Before replacing the fuse, set the POWER switch Ⓐ to "OFF" and disconnect the power cord from an AC outlet.
2. Remove seven screws ① and take out the top cover.

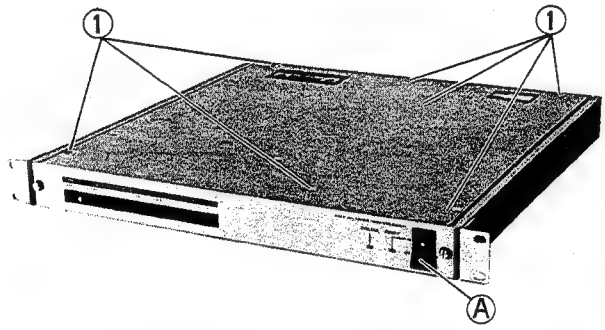


Fig. 2-1

3. There is a fuse on the PS board.
   For the safety and protection of the unit, replace only with fuses having specified part numbers.
   F1 : Refer to the section 7.9 PS BOARD assembly.

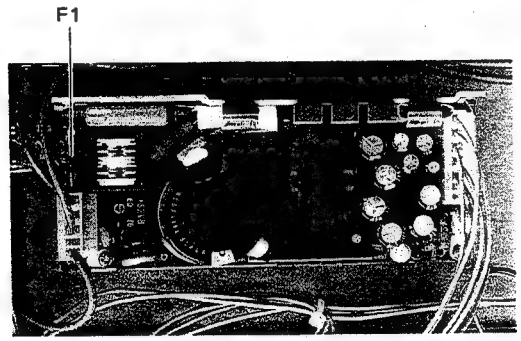


Fig. 2-2

2.2 REMOVAL OF THE PRINCIPAL CIRCUIT BOARDS

- Before removing, take out the top cover.

2.2.1 Location of circuit boards

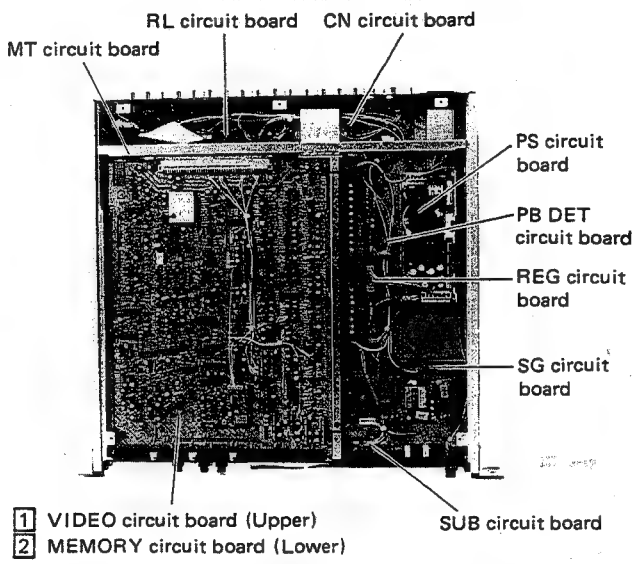


Fig. 2-3

2.2.2 Removing the MEMORY/VIDEO boards

1. Loosen two screws ② on the front panel and take out the front panel.

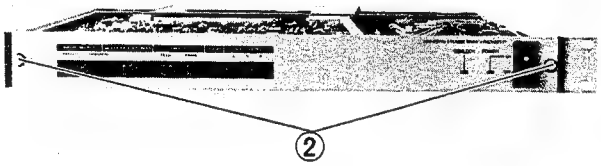


Fig. 2-4

2. Remove two screws ③ and release the hooks Ⓑ (turn to front) on the both sides of the board simultaneously and pull out the board.

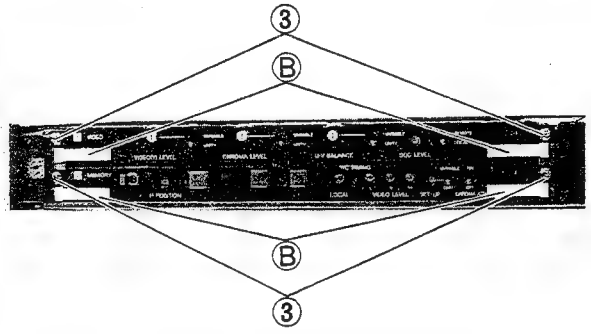


Fig. 2-5-1

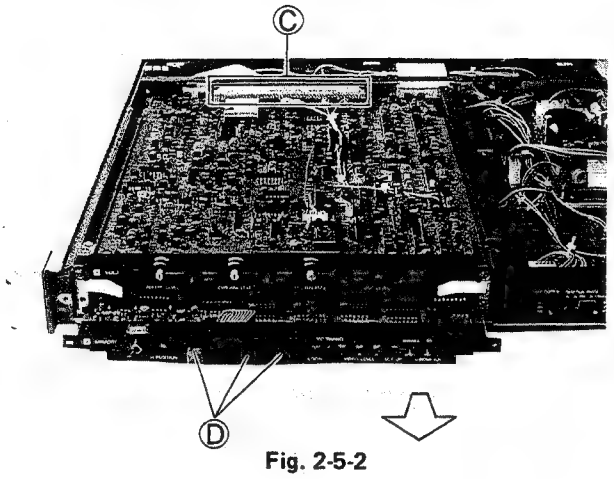


Fig. 2-5-2

- For electrical adjustments, [1] VIDEO board and [2] MEMORY board are exchangeable about connection to MT board.
- When insert the board, be sure to check the connection of connector Ⓒ .
- The push switches Ⓓ on the [2] MEMORY board are supplied as assembly parts for service. Switch cover or LED are not supplied individually.

2.2.3 Removing the SG board

1. Remove two screws ④ fixing the SG board, and pull the board toward front.

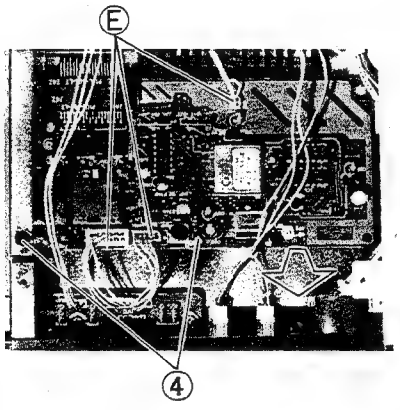


Fig. 2-6

2.2.4 Removing the REG and PB DET boards

1. Remove the SG board according to section 2.2.3.
2. Remove two screws ⑤ then take out the PB DET board.
3. Remove connectors Ⓕ to Ⓘ and pull the REG board toward front.
   - Connectors Ⓕ : Disconnectable on the REG board.
   - Connectors Ⓖ and Ⓗ : Pull out from LED's feet.
   - Connector Ⓘ : Pull out from IC's feet.

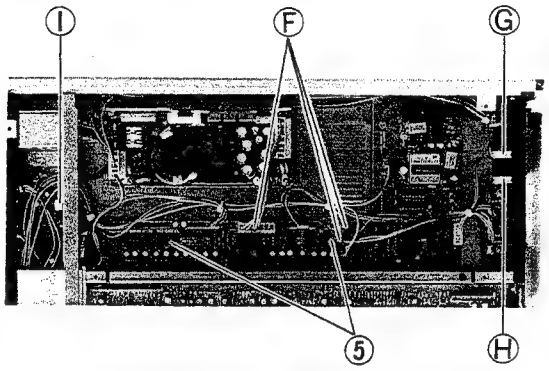


Fig. 2-7

2.2.5 Removing the PS board

1. Remove two screws ⑥ and remove two connectors Ⓚ to take out the PS board assembly.

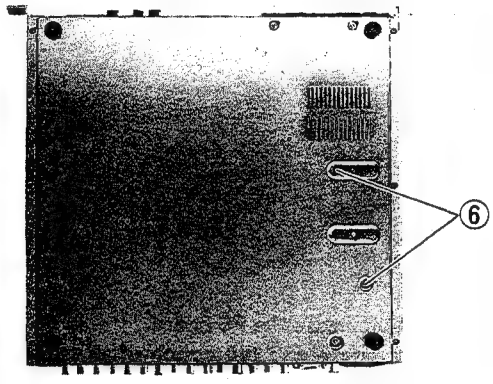


Fig. 2-8-1

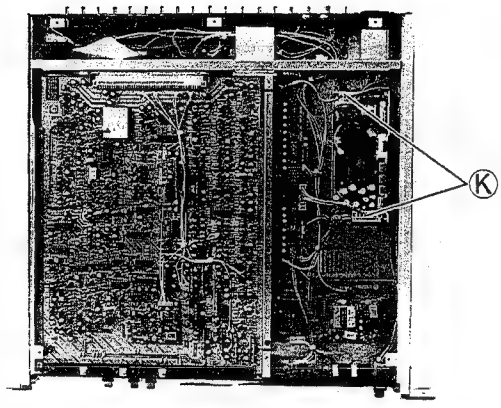


Fig. 2-8-2

2. To see the soldered side, take out the siled cover by the following procedure.
   (1) Remove three transistor fixing brackets Ⓛ .
   (2) Remove two screws Ⓜ , then remove the PS board from the bracket.

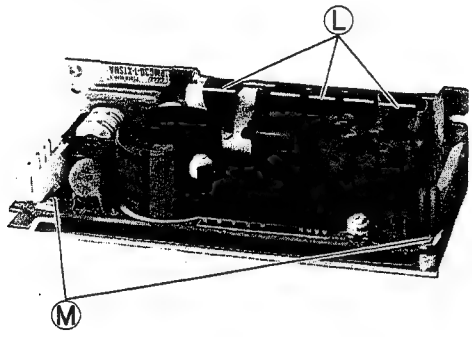


Fig. 2-9

2.2.6 Removing the RL/CN boards

1. Remove five screws ⑧ fixing the rear panel and take out both RL and CN boards with the panel.

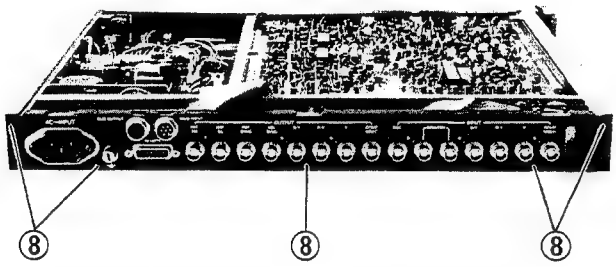


Fig. 2-10

2.2.7 Removing the SUB board

1. Remove two screws ⑨ fixing the SUB board, a connector Ⓝ on the REG board and connectors Ⓞ on the SG board.

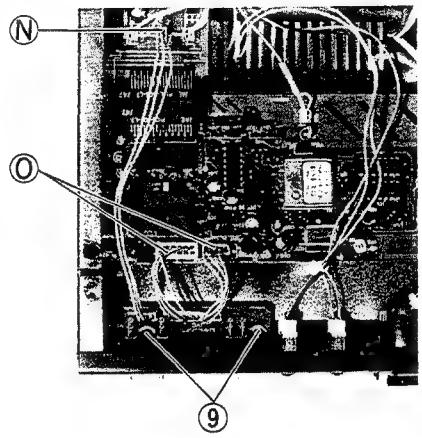
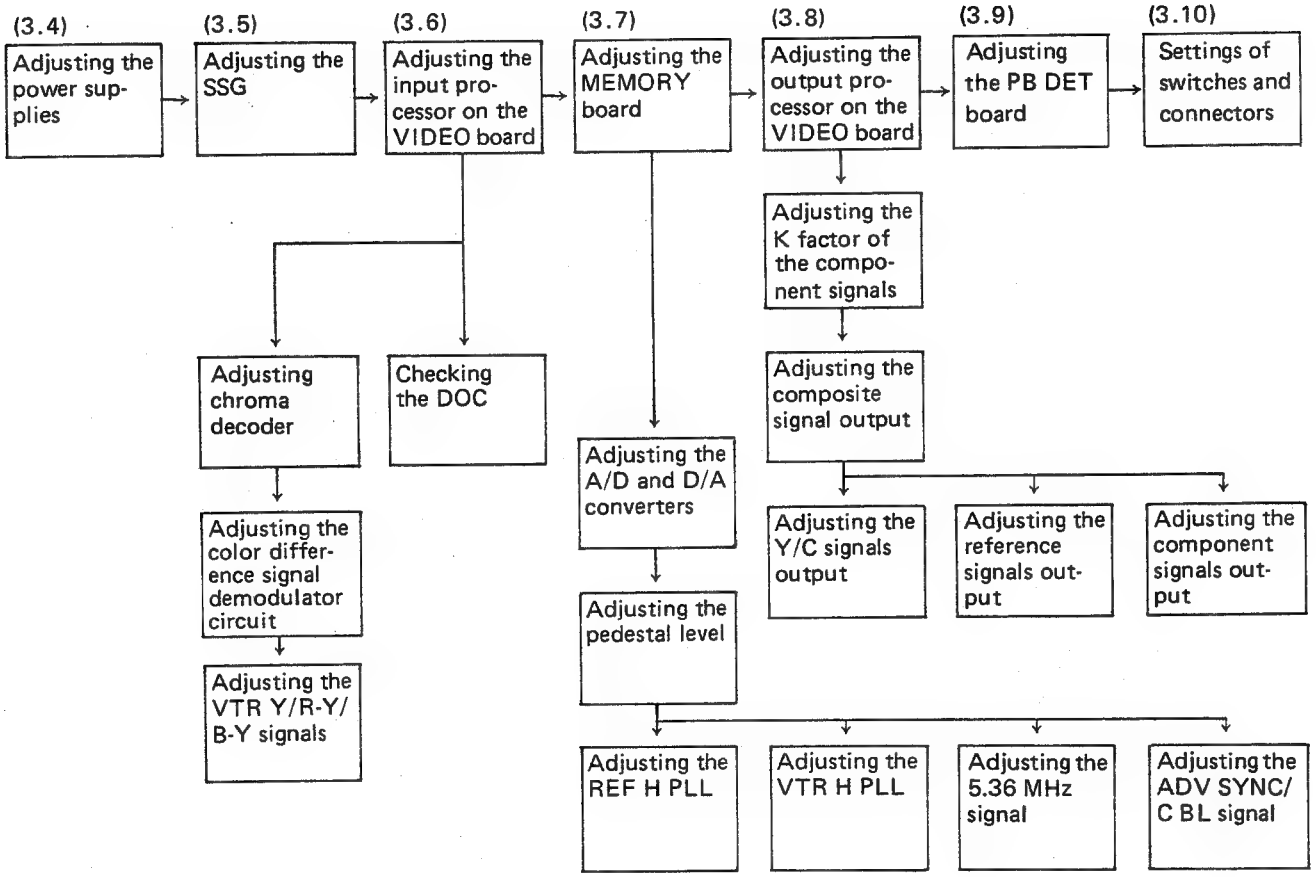


Fig. 2-11

SECTION 3
ADJUSTMENT PROCEDURE

3.1 ADJUSTMENT PROCEDURES

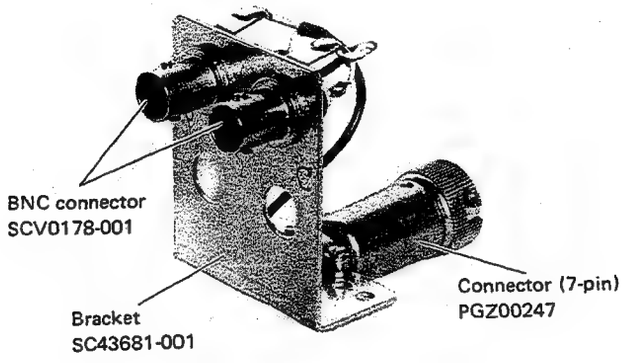
Numbers in (.) indicate the chapters where the relevant descriptions are given.

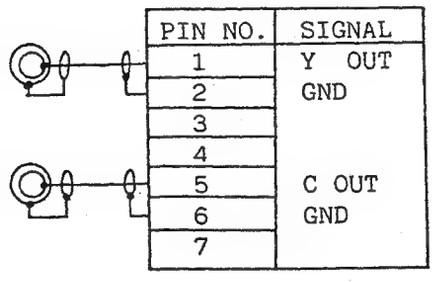


3.2 INSTRUMENTS REQUIRED FOR ADJUSTMENT AND THEIR SETUP

3.2.1 Instrument to be prepared

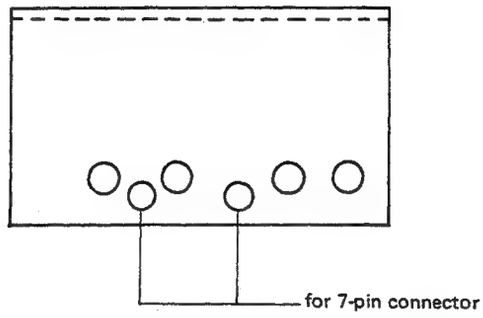
1. DC voltmeter (digital voltmeter is preferable)
2. Oscilloscope (dual trace is preferable)
3. Test signal generator (should be able to output color bars signal and 2T pulse)
4. Frequency counter
5. Color monitor TV
6. Waveform monitor
7. Vectorscope
8. VTR
   3/4" U-VCR (with DOC output):
   Required for "Checking the DOC" of the input processor on the VIDEO board.
9. 7-pin – BNC conversion connector for Y/C OUTPUT connector. Requred for adjusting the Y/C signals output:
   Following are idea of jigs for your workshop use.
   JVC supplies individual parts for those jig according to your parts order.
   Assemble the parts as shown below.





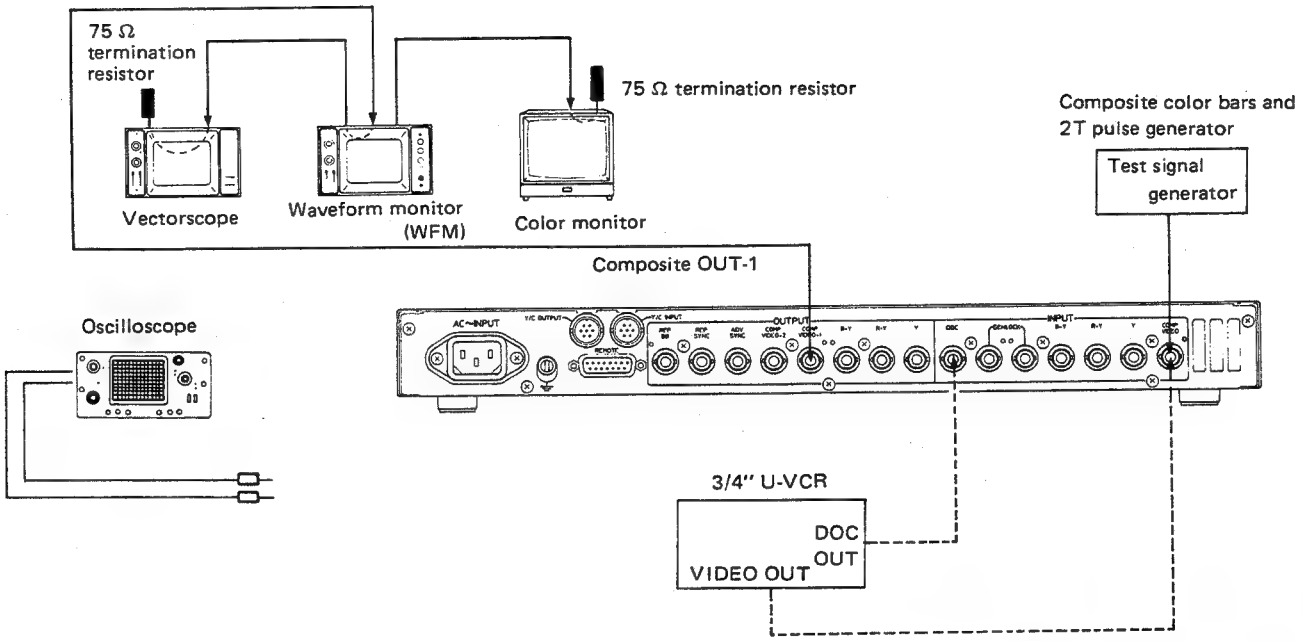
PIN NO.	SIGNAL
1	Y OUT
2	GND
3	
4	
5	C OUT
6	GND
7	

Note: Use the following holes of the bracket as shown below.



10. Accessary 7 pin – 7 pin/BNC cable for adjusting the PB DET board.
    Part No. : SCV1588-001

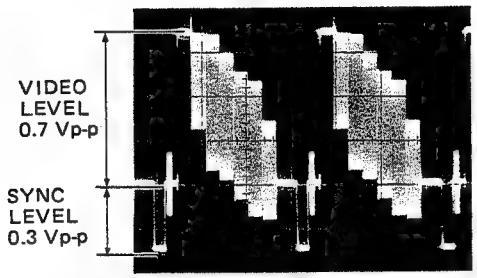
3.2.2 Standard setup



3.3 PRIOR TO ADJUSTMENT

Unless otherwise specified, adjustment should be performed under the following conditions.

1. Input signal: composite color bars signal (EBU color bars)
2. Front panel setting
   - LOCAL/REMOTE switch: "LOCAL" position
   - OPERATE/BY-PASS button: Operate mode (button lights)
   - VARIABLE/UNITY switch (x4): All "UNITY" position
   - INPUT SELECT switch: "COMPOSITE" position
   - FIELD, FRAME] buttons: Normal mode (button unlit)



No.	Item	Measuring instrument	Measuring point & Adjustment level and Location	Adjustment procedure

3.4 ADJUSTING THE POWER SUPPLIES

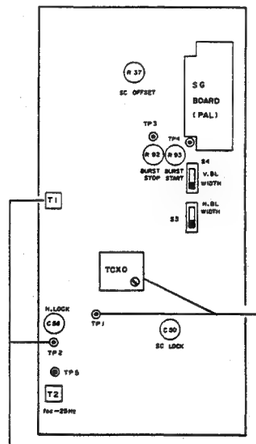
1	Adjusting the DC 5 V power supply	Digital voltmeter	REG board TP5 . . . +5 V DC PS board VR51 (+5 V ADJ)	(1) Connect the digital voltmeter between TP5 and TP7 (GND) on the REG board, then adjust the +5 V ADJ control (VR51) on the PS board so that the voltmeter reads +5 V DC. (2) Check if the specified voltage appears at each test point.
2	Checking the +9 V DC, +12 V DC, −9 V DC, −12 V DC		REG board TP2 . . . +9 V DC TP3 . . . −12 V DC TP4 . . . −9 V DC TP6 . . . +12 V DC (TP7 . . . GND)	

No.	Item	Measuring Instruments	Measuring Points, Adjusting Levels & Adjusting Points	Procedures

3.5 ADJUSTING THE SSG

1 SC frequency adjustment

Measuring Instruments: Frequency counter, Oscilloscope



	Signal	Test Point	SG board
SC Frequency	4.433619 MHz ± 10 Hz	SG board TP1	TCXO
SC Output	Maximum Amplitude	SG board TP2	SC FREQ

- Warm up the camera for more than 15 minutes, with the lens iris closed.
- The frequency counter is:
  1) The 8 digits or more display is preferable.
  2) Required of an accuracy of more than 0.1 ppm, or 1 x 10^{-7}, at 0°C to 40°C.
- Take out SG board [9] , attach an extension board and reset.

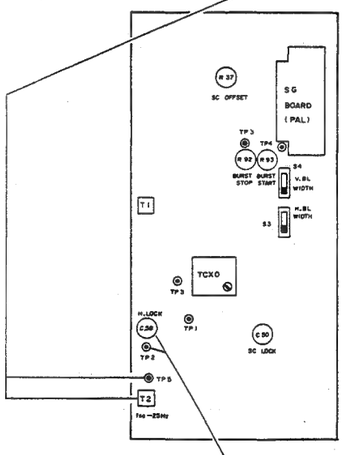
(1) Adjust as shown in the tabel below.

2 Internal fsc-25Hz lock adjustment

Measuring Instruments: Oscilloscope

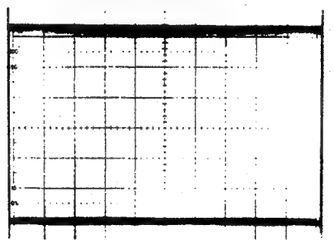
Measuring Points, Adjusting Levels & Adjusting Points: fsc-25 Hz (T2), 282 fh LOCK (C58)

Test Point	Adjustment	
TP5	fsc-25 Hz (T2) Transformer	Maximum Output (3 Vp-p or more)



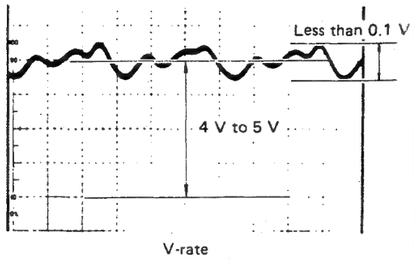
TP2	282 fh LOCK (C58) Trimmer capacitor	Ripple : Less than 0.1 V Average DC : 4 to 5 V

(1) Connect an oscilloscope to TP5 with H-rate time division.
(2) Adjust core of transformer (T2) so that maximum output amplitude.



H-rate

(3) Connect an oscilloscope to TP2 with V-rate time division.
(4) Adjust trimmer capacitor (C58) so that averaged DC level of waveform is 4 V to 5 V and minimum ripple are observed.



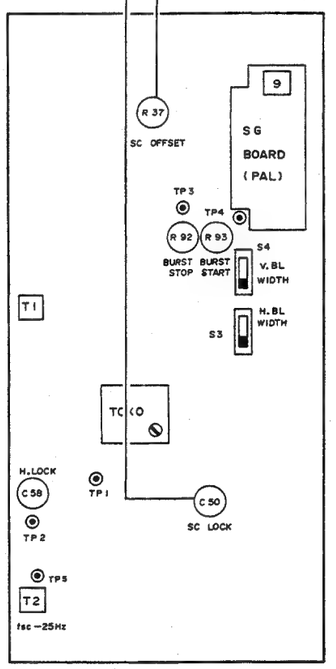
V-rate

No.	Items	Measuring Instruments	Measuring Points, Adjusting Levels & Adjusting Points	Procedures

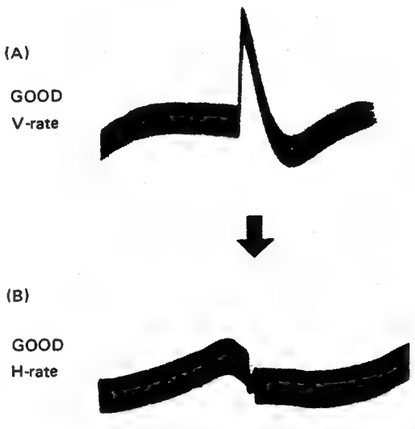
3 SC LOCK adjustment

Measuring Instruments: Digital voltmeter, Oscilloscope (V-rate: 10 : 1)

Measuring Points, Adjusting Levels & Adjusting Points: TP3, SC LOCK (C50), OFFSET (R37)



(1) Apply composite video or black burst signal from a sync pulse generator to the GENLOCK INPUT terminal of the camera.
(2) Adjust SC LOCK (C50) so that the SG board TP3 DC level is 4.5 V ± 0.3 V.
(3) Adjust OFFSET (R37) to minimize the waveform as shown below (jittering).

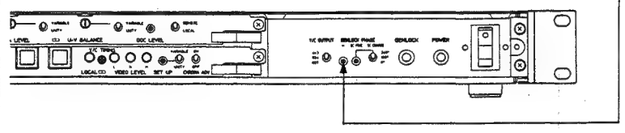


(4) Set the vectorscope, if used, to EXT LOCK, and adjust SC LOCK (C50) so that the jitter is minimized.

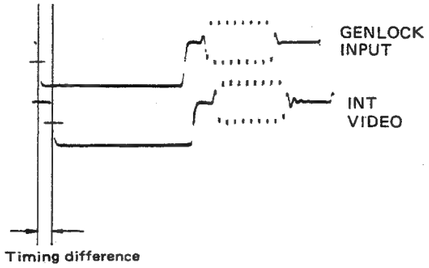
4 H-PHASE adjustment

Measuring Instruments: Oscilloscope (H-rate: 10 : 1)

Measuring Points, Adjusting Levels & Adjusting Points: H-PHASE

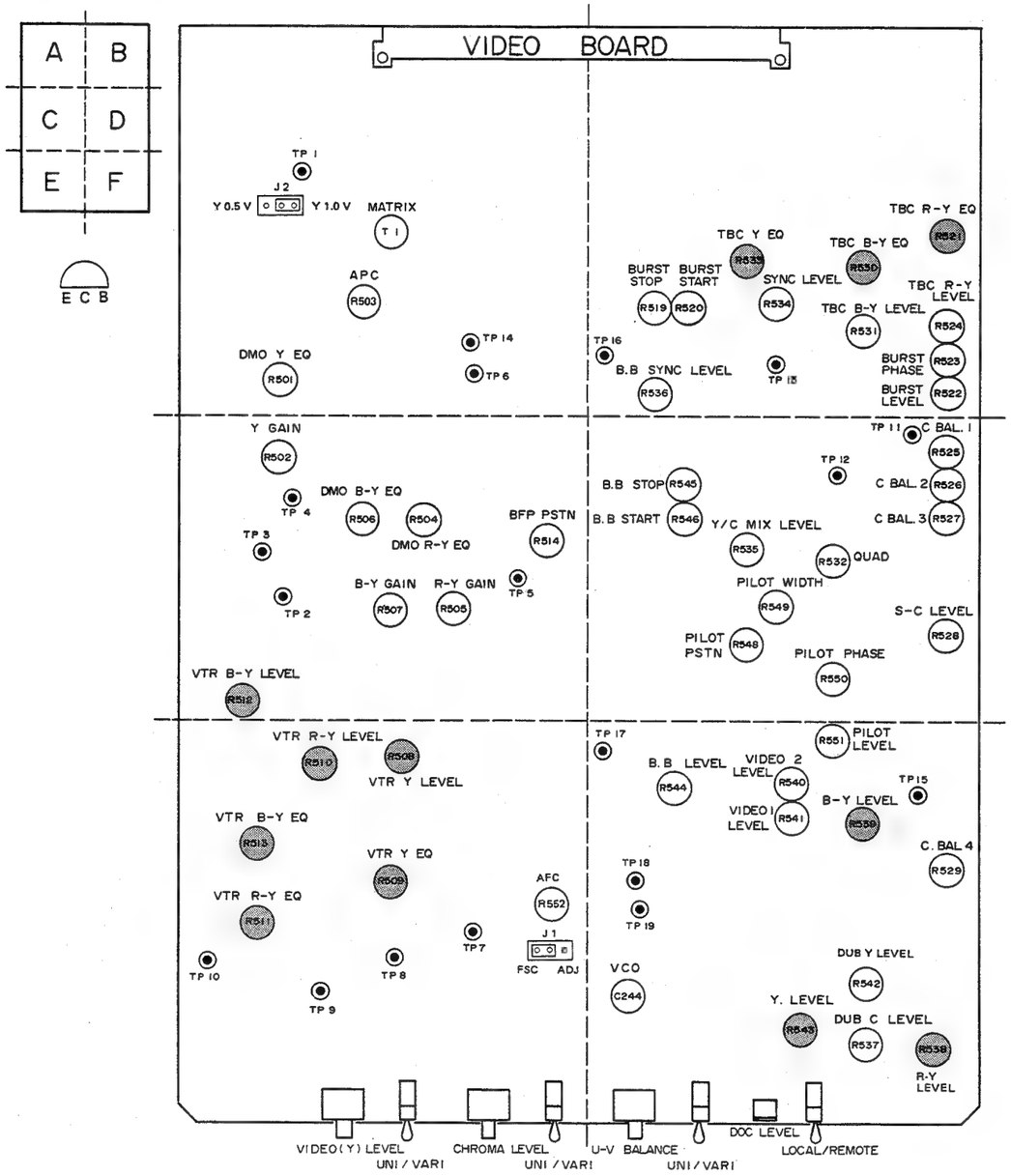


(1) Remove the 75 Ω termination plug on the GENLOCK INPUT, then connect A channel of a dual-trace oscilloscope to GENLOCK INPUT.
(2) Connect the B CH oscilloscope input to the COMP VIDEO OUTPUT connector.
(3) Observe the two inputs simultaneously on the oscilloscope and compare their phases.
(4) Adjust the H-PHASE (front panel) so that the internal video (camera output) H-sync is coincide with GENLOCK INPUT (external reference signal).



■ LOCATION OF ADJUSTMENT CONTROLS ON THE VIDEO BOARD

Shaded (▒) VRs are paint-locked. Do not turn these VRs in ordinary servicing.

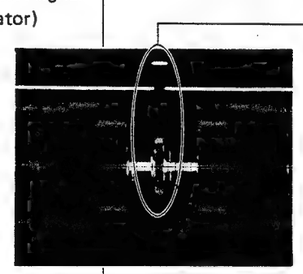
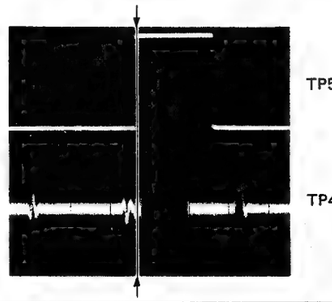
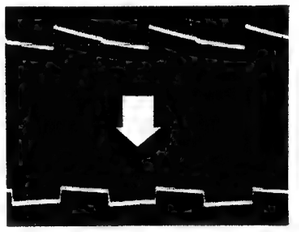
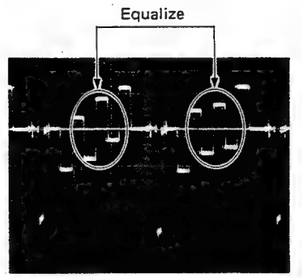


No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure

3.6 ADJUSTING THE INPUT PROCESSOR ON THE VIDEO BOARD

- Also refer to the "Location of adjustment controls on the VIDEO board" on the left page. The letter in square brackets [ ] in the adjustment location column indicates the block number in the above it and indicates that there is an adjustment control in the block indicated.
- Following "3.3 PRIOR TO ADJUSTMENT", set the specified input signals and switches.

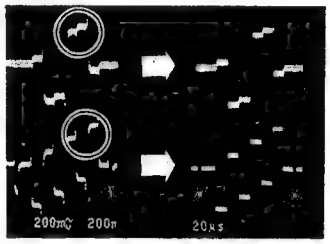
3.6.1 Adjusting the chroma decoder

1	Adjusting the BFP position	Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ TP4 [C] ◎ TP5 [C] ⓣ BFP POSITION (R514) [C]	(1) Connect A ch. of the oscilloscope to TP4. (2) Connect B ch. of the oscilloscope to TP5. (3) Adjust so that the starting position of the BFP (TP5) matches that of the burst signal (TP4).  
2	Adjusting the APC	Oscilloscope (10 : 1, V-rate) Composite color bars (test signal generator)	◎ TP14 [A] ⓣ APC (R503) [A]	(4) Adjust so that the waveform is as close to a straight line as possible. 
3	Adjusting the MATRIX	Frequency counter	◎ TP3 [C] ⓣ T1 [A]	(5) Adjust T1 to obtain the same waveform as that before 1H. 

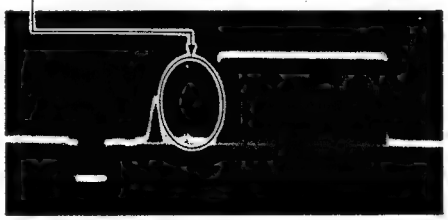
No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (Ⓣ) Adjustment level (☆)	Adjustment procedure

3.6.2 Adjusting the color difference signal demodulator circuit

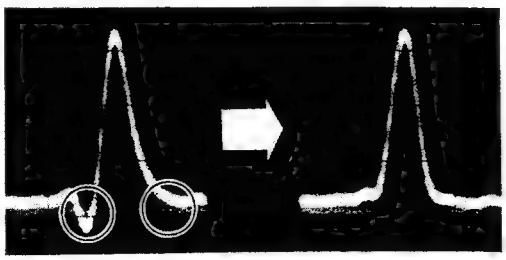
Before starting this "K factor" adjustment, perform the "K factor adjustment" described in the section 3.6.4 "Adjusting the VTR Y/R-Y/B-Y signals".

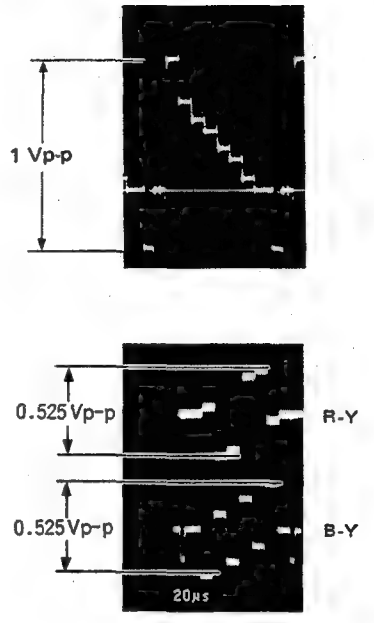
1	K factor adjustment	Oscilloscope (10 : 1, H-rate) Composite color bars signal (test signal generator)	◎ TP2 [C] Ⓣ DMO R-Y EQ (R504) [C] ☆ Minimize ringing.	(3) Set the INPUT SELECT switch on the front panel to the "COMPOSITE" position. (4) Minimize ringing.
			◎ TP3 [C] Ⓣ DMO B-Y EQ (R506) [C] ☆ Minimize ringing.	R-Y B-Y 
		Oscilloscope (10 : 1, H-rate) 2T pulse (test signal generator)	◎ TP1 [A] Ⓣ DMO Y EQ (R501) [A] ☆ Minimize distortion.	(5) Minimize distortion.

Extend the portion shown below using oscilloscope.



2T pulse

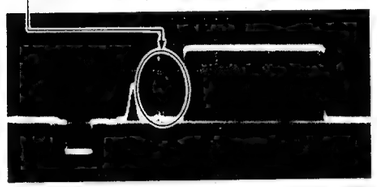


No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure
3	Adjusting the signal level	Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ TP1 [A] ⓣ Y GAIN (R502) [C] ☆ 1.0 Vp-p --- ◎ TP2 [C] ⓣ R-Y GAIN (R505) [C] ☆ 0.525 Vp-p --- ◎ TP3 [C] ⓣ B-Y GAIN (R507) [C] ☆ 0.525 Vp-p	(6) Adjust the level. 

3.6.3 Adjusting the VTR Y/R-Y/B-Y signals

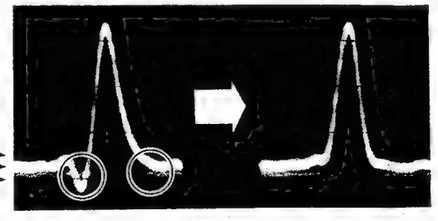
No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure
1	K factor adjustment	Oscilloscope (10 : 1, H-rate) 2T pulse (test signal generator)	◎ TP8 [E] ⓣ VTR Y EQ (R509) [E] ☆ Minimize distortion.	• In ordinary servicing, this adjustment is not necessary. (Adjusting VRs are paint locked.) (1) Set the INPUT SELECT switch to the "COMPONENT" position. (2) Suply 2T pulse to the Y INPUT connector on the rear panel. (3) Minimize distortion.
			◎ TP9 [E] ⓣ VTR R-Y EQ (R511) [E] ☆ Minimize distortion.	(4) Suply 2T pulse to the R-Y INPUT connector on the rear panel. (5) Minimize distortion.
			◎ TP10 [E] ⓣ VTR B-Y EQ (R513) [E] ☆ Minimize distortion.	(6) Supply the 2T pulse to the B-Y INPUT connector on the rear panel. (7) Minimize distortion.

Extend the portion shown below using oscilloscope



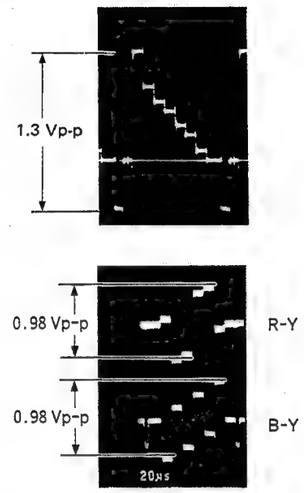
2T pulse

Suply the Composite Sync signal synchronized with 2T pulse to the Y INPUT connector.



No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure
2	Adjusting the level	Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ TP8 [E] ⓣ VTR Y LEVEL (R508) [E] ☆ 1.3 Vp-p	(3) Match the levels.
			◎ TP9 [E] ⓣ VTR R-Y LEVEL(R510) [E] ☆ 0.98 Vp-p	
			◎ TP10 [E] ⓣ VTR B-Y LEVEL(R512) [C] ☆ 0.98 Vp-p	

Perform adjustment with the VARI/UNITY switches on the escutcheon on the VIDEO board all set to the "UNITY" position.

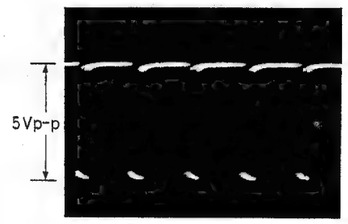


3.6.4 Checking the DOC (dropout compensation) circuit

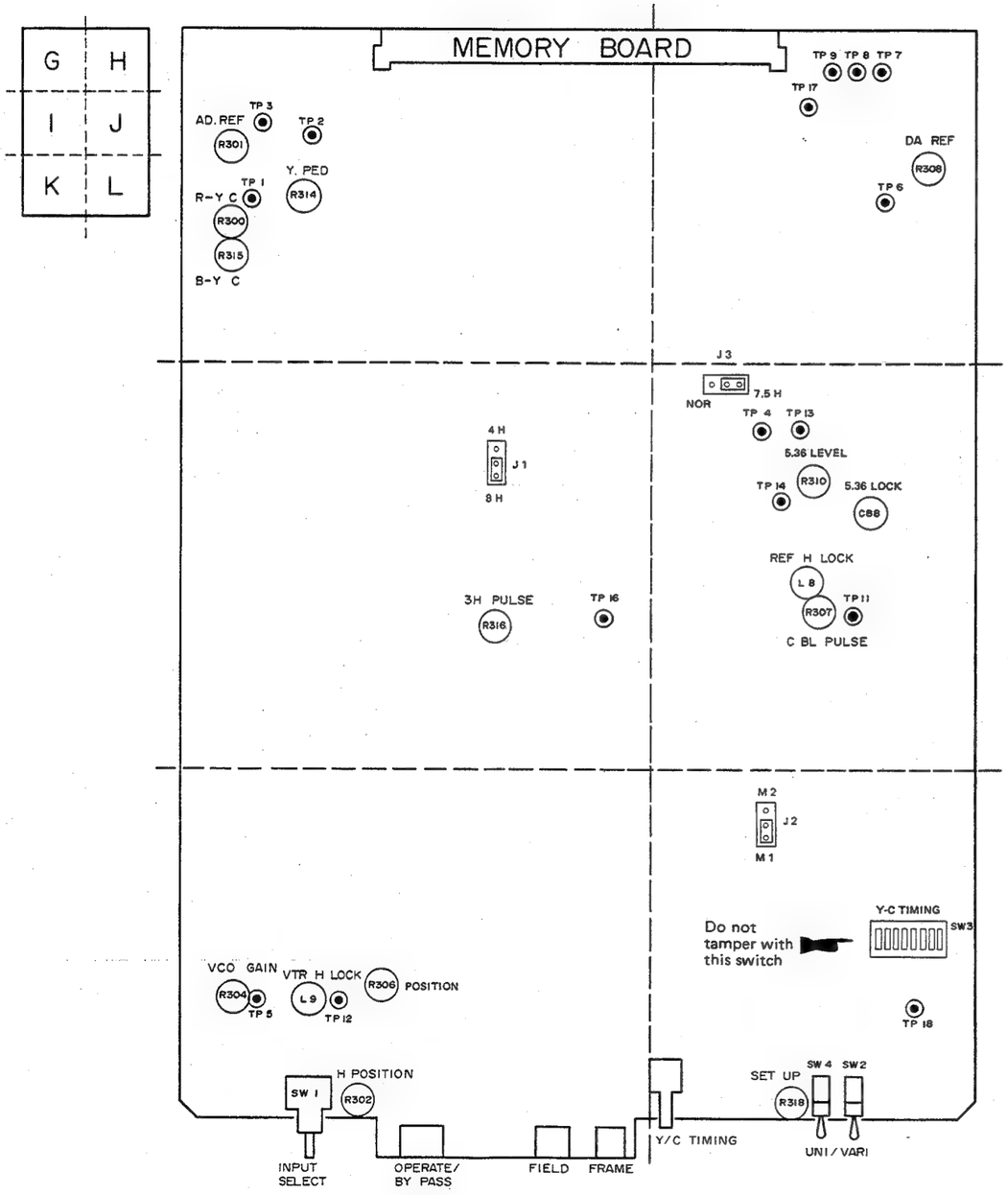
A 3/4" VCR with a DOC output is necessary.

- Input the DOC output from the 3/4" VCR to the DOC input connector on the rear panel.

1	Checking the DOC	Oscilloscope (10 : 1, H-rate) 3/4" VCR DOC OUT	◎ TP7 [E]	(1) Playback the VCR at the "FF" or "REW" mode. (2) Check if negative pulse appears at TP7.



■ LOCATION OF ADJUSTMENT CONTROLS ON THE MEMORY BOARD



No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure

3.7 ADJUSTING THE MEMORY BOARD

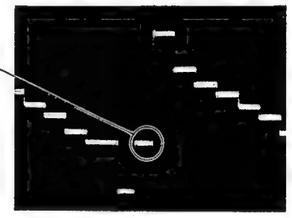
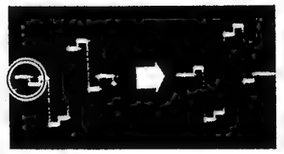
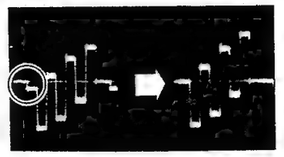
- Also refer to the "Location of adjustment controls on the MEMORY board" on page 3-9.
  The letter in square brackets [ ] in the adjustment location column indicates the block number in the above it and indicates that there is an adjustment control in the block indicated.
- Following "3.3 PRIOR TO ADJUSTMENT", set specified input signals and each switch.

3.7.1 Adjusting the A/D and D/A converters (no input signals are necessary)

1	Adjusting the reference voltage of the A/D converter	Digital voltmeter (DC range)	◎ TP3 [G] ⓣ AD REF (R301) [G] ☆ 3 V DC	(1) Adjust to the specified voltages.
2	Adjusting the reference voltage of the D/A converter		◎ TP6 [H] ⓣ DA REF (R308) [H] ☆ 2 V DC	

3.7.2 Adjusting the pedestal level

- Set the SET UP VARI/UNITY switch on the escutcheon of the MEMORY board to the "UNITY" position.

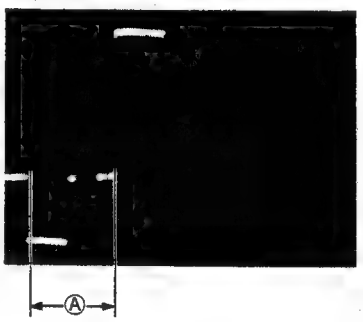
1	Adjusting the Y signal pedestal level	Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ Y output (rear panel) 75-ohm terminated ⓣ Y PED (R314) [G]	(1) Fully turn the H POSITION control on the escutcheon clockwise (↷). (2) During the H blanking period, make the back porch portion flat.  (3) Set the H POSITION control to its mechanical center position.
2	Adjusting the center level of the chroma signal		◎ R-Y OUTPUT (rear panel) 75-ohm terminated ⓣ R-Y C (R300) [G] ◎ B-Y OUTPUT (rear panel) 75-ohm terminated ⓣ B-Y C (R315) [G]	(4) During the H blanking period, make the back porch portion flat.  

No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (Ⓣ) Adjustment level (☆)	Adjustment procedure

3.7.3 Adjusting the REF H PLL (no input signal is necessary)

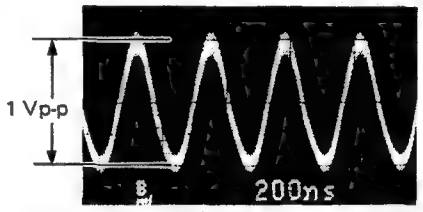
1	Adjusting the reference H LOCK	Digital voltmeter (DC range)	◎ TP11 [J] Ⓣ REF H LOCK (L8) [J] ☆ +2.5 V DC	(1) Adjust to the specified level.

3.7.4 Adjusting the VTR H PLL (no input signal is necessary)

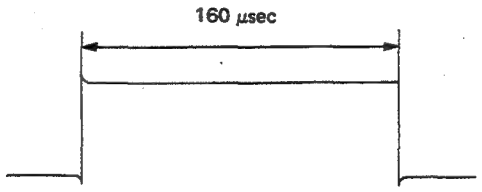
1	Adjusting the VTR H LOCK	Digital voltmeter (DC range)	Ⓣ VCO GAIN (R304) [K] Ⓣ H POSITION (R302) [K] — Mechanical center ◎ TP5 [K] Ⓣ VTR H LOCK (L9) [K] ☆ –4 V	(1) Adjust the level.
2	Adjusting the horizontal position	Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ COMP. VIDEO-1 OUTPUT (rear panel) 75-ohm terminated Ⓣ POSITION (R306) [K] ☆ Match the point Ⓐ.	(1) Turn R306 fully clockwise. (2) While pressing the OPERATE/BY-PASS button several times, adjust to match the start point of the video signal (Ⓐ shown below) between OPERATE mode and BY-PASS mode. 

No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure

3.7.5 Adjusting the 5.36 MHz signal (no input signal is necessary)

1	Adjusting the 5.36 MHz lock	Frequency counter	ⓣ 5.36 LEVEL (R310) [J] ☆ Mechanical center ◎ TP13 [J] ⓣ 5.36 LOCK (C88) [J] ☆ 5.357446 MHz	(1) Set the Y/C OUTPUT switch to "Y/C924" position. (2) Set R310 (5.36 LEVEL) to its mechanical center. (3) Adjust to the specified value.
2	Adjusting the level	Oscilloscope (10 : 1, 200 nsec)	◎ TP13 [J] ⓣ 5.36 LEVEL (R310) [J] ☆ 1 Vp-p	(4) Adjust to the specified level. 

3.7.6 Adjusting the ADV SYNC/C BL signal (no input signal is necessary)

1	Adjusting the V reset pulse width (ADV SYNC)	Oscilloscope (10 : 1, V-rate)	◎ TP16 [I] ⓣ 3H PULSE (R316) [I] ☆ 160 μsec width	(1) Adjust the pulse width. 
2	Adjusting the BL pulse width (C BL)	Oscilloscope (10 : 1, H-rate)	◎ TP4 [J] ⓣ C BL PULSE (R307) [J] ☆ 11 μsec width	

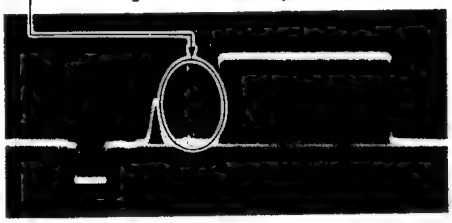
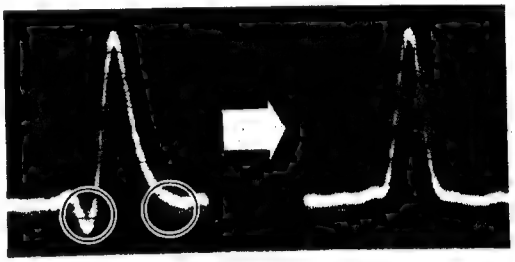
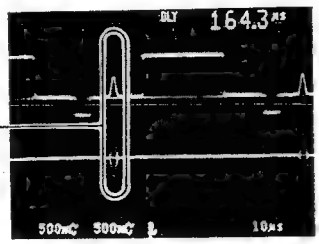
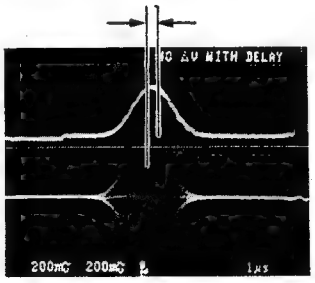
No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (Ⓣ) Adjustment level (☆)	Adjustment procedure

3.8 ADJUSTING THE OUTPUT PROCESSOR ON THE VIDEO BOARD

- Also refer to the "Location of adjustment controls on the VIDEO board" on page 3-5.
  The letter in square bracket [ ] in the adjustment location column indicates the block number in the above layout and indicates that there is an adjustment control in the block indicated.
- Following "3.3 Prior to adjustment", set the specified input signals and switches.

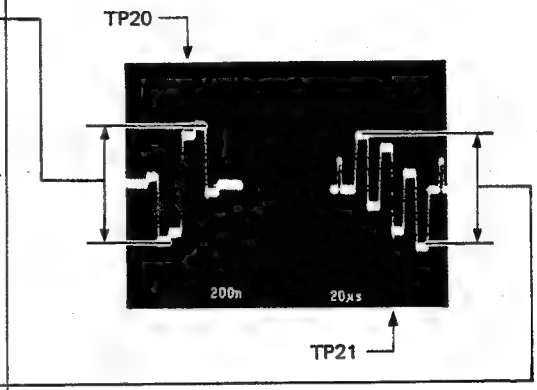
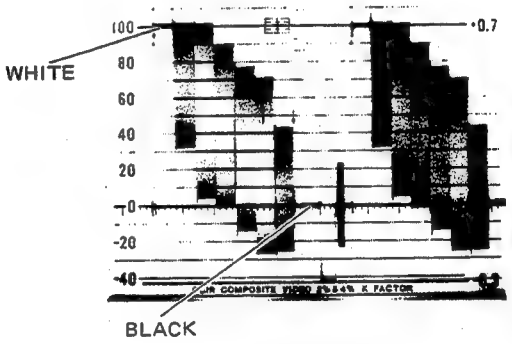
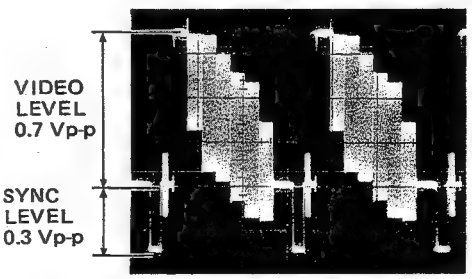
3.8.1 Adjusting the K factor of component signals

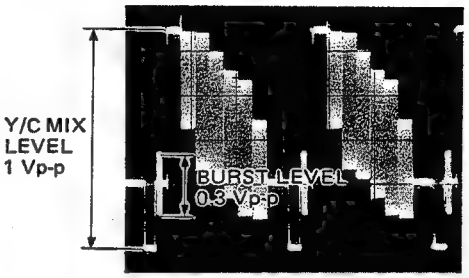
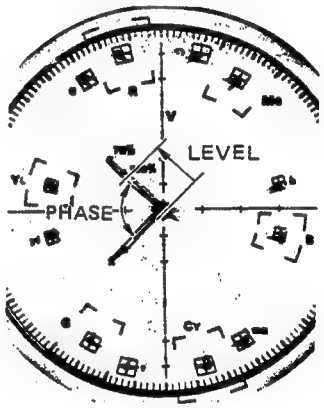
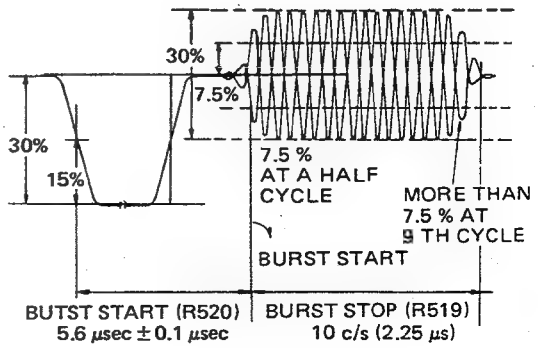
Test signal generator with component outputs is necessary for correct adjustment of K factor. So this adjustment is unnecessary at ordinary servicing. But if rotate the adjusting potentiometer, perform coarse adjustment shown below.

1	K factor adjustment	Oscilloscope (10 : 1, H-rate) 2T pulse (test signal generator)	◎ Y OUT PUT (rear panel) 75 Ω terminated Ⓣ TBC Y EQ (R533) [B] ☆ Minimize distortion Extend the portion shown below using an oscilloscope.  2T pulse	(1) Set the INPUT SELECT switch to the "COMPONENT" position. (2) Suply 2T pulse to Y INPUT on the rear panel. (3) Minimize distortion. 
2	Adjusting the Y/C timing		◎ Y OUTPUT (rear panel) 75 Ω terminated ◎ R-Y OUTPUT (rear panel) 75 Ω terminated Ⓣ TBC R-Y EQ (R521) [B] ☆ Minimize time-difference Extend the portion shown below using an oscilloscope.  ◎ B-Y OUTPUT (rear panel) 75 Ω terminated Ⓣ TBC B-Y EQ (R530) [B] ☆ Minimize time-difference	(4) Set the INPUT SELECT switch to the "COMPOSITE" position. (5) Connect the measuring instruments. 2T pulse : COMP VIDEO INPUT (rear panel) Ach. of oscilloscope : Y OUTPUT (75 Ω terminated) Bch. of oscilloscope : R-Y OUTPUT (75 Ω terminated) (6) Minimize time-difference between Ach. and Bch.  (7) Connect Bch. of an oscilloscope to the B-Y OUTPUT. (75 Ω terminated) (8) Minimize time-difference between Ach. and Bch.

No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure

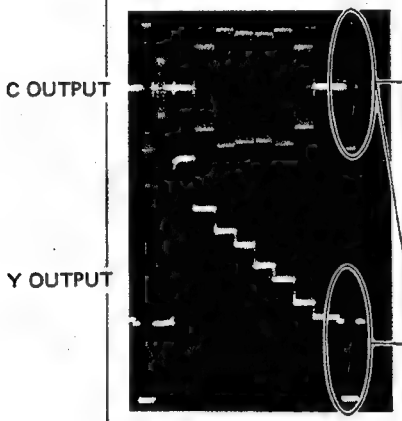
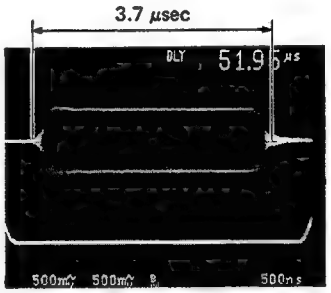
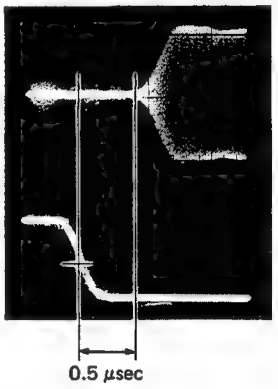
3.8.2 Adjusting the composite signal outputs

1	Adjusting the color difference signal level	Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ TP11 [D] ⓣ TBC R-Y LEVEL(R524)[B] ☆ 0.8 Vp-p --- ◎ TP12 [D] ⓣ TBC B-Y LEVEL(R531)[B] ☆ 0.528 Vp-p	(1) Adjust to the specified level. 
2	Adjusting the carrier balance		◎ COMP VIDEO-1 OUTPUT (rear panel) (75-ohm terminated) ⓣ C BAL 1 (R525) [D] ⓣ C BAL 2 (R526) [D] ☆ Carrier leak minimum ⓣ C BAL 3 (R527) [D] ☆ Carrer leak minimum	(2) Turn the controls alternately so that the carrier leak in the white and black portions is minimum.  (3) Adjust to minimize carrier leakage of each line.
3	Adjusting the video level (1)	Waveform monitor or Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ COMP VIDEO-2 OUTPUT (rear panel) (75-ohm terminated) ⓣ VIDEO-2 LEVEL(R540)[F] ☆ 0.7 Vp-p --- ◎ COMP VIDEO-1 OUTPUT (rear panel) (75-ohm terminated) ⓣ VIDEO-1 LEVEL(R541)[F] ☆ 0.7 Vp-p --- ◎ COMP VIDEO-1 OUTPUT (rear panel) (75-ohm terminated) ⓣ SYNC LEVEL (R534)[B] ☆ 0.3 Vp-p	(4) Adjust the VIDEO LEVEL-2/1 and SYNC LEVEL controls in this order. 

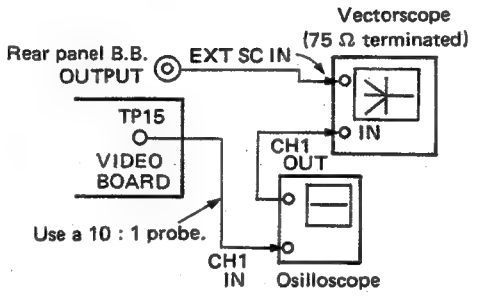
No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure
4	Adjusting the video level (2)	Waveform monitor or Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ COMP VIDEO-1 OUTPUT (rear panel) (75-ohm terminated) ⓣ Y/C MIX LEVEL(R535)[D] ☆ 1 Vp-p --- ◎ COMP VIDEO-1 OUTPUT (rear panel) (75-ohm terminated) ⓣ BURST LEVEL(R522)[B] ☆ 0.3 Vp-p (40 IRE)	(5) Adjust the Y/C MIX LEVEL and BURST LEVEL controls in this order. 
5	Adjusting the guadrature	Vectorscope Composite color bars (test signal generator) In case a vectorscope is not available, do not perform adjustment. If the spots are not at the correct points with QUAD, perform adjustments Y/C MIX LEVEL (R535), TBC B-Y LEVEL (R531) and QUAD (R532) again in this order.	◎ COMP VIDEO-1 OUTPUT (rear panel) (75-ohm terminated) ⓣ QUAD (R532)[D] ⓣ BURST PHASE (R523)[B] ⓣ BURST LEVEL (R522)[B]	(6) Calibrate the gain of the vectorscope or set to 75% (preset position).  (7) Check if all spots (R, G, B, MG, CY and YL) are at the correct points (within ⊞) on the vectorscope. If they are not, perform adjustment. (8) Adjust R523 and R522 respectively for correct burst phase and burst level.
6	Adjusting the burst position and width	Waveform monitor or Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ COMP VIDEO OUTPUT (rear panel) (75-ohm terminated) ⓣ BURST START (R520)[B] ⓣ BURST STOP (R519)[B]	(9) Match them as follows. 

No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure

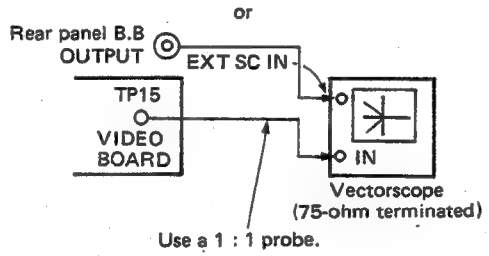
3.8.3 Adjusting the Y/C signals output

1	Pilot Burst adjustment (for Y/C924 signal)	Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ Y OUTPUT (7-pin – BNC conversion connector) (75-ohm terminated) ◎ C OUTPUT (7-pin – BNC conversion connector) (75-ohm terminated) ⓣ PILOT WIDTH (R549) [D] ☆ 3.7 μsec width  ⓣ PILOT PSTN (R548) [D] ☆ 0.5 μsec from falling portion of H-sync of Y signal.	• Connect 7-pin – BNC conversion connector to Y/C OUTPUT of rear panel. • Set the Y/C OUTPUT switch to "924" position. (1) Connect A ch. of the oscilloscope to Y OUTPUT. (2) Connect B ch. of the oscilloscope to C OUTPUT. (3) Adjust so that PILOT BURST width of C signal becomes specified value.  (4) Adjust so that start point of PILOT BURST becomes specified value. 

No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment parts (Ⓣ) Adjustment level (☆)	Adjustment procedure
		• In case a vectorscope is not available, do not perform adjustment.		(5) Adjust the GAIN knob of a vectorscope so that RED point matches the outer line on the vectorscope. (6) Adjust so that PILOT BURST comes the point shown below. **Note:** Some types of vectorscope do not provide visual image of PILOT BURST signal. In such a case, do not perform this adjustment.



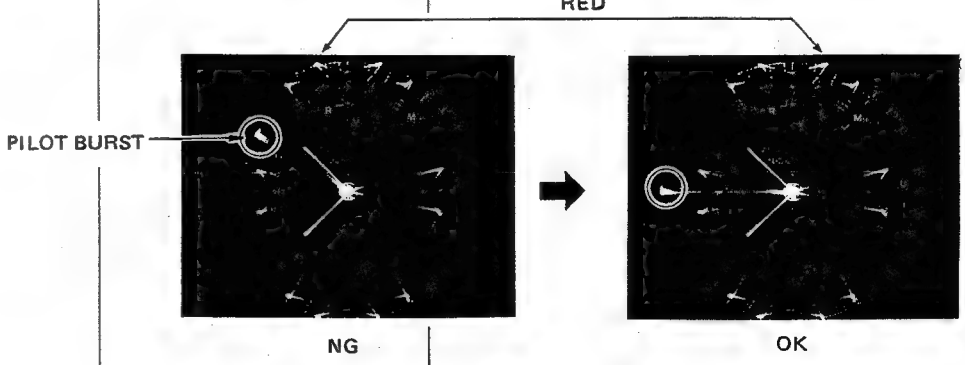
or

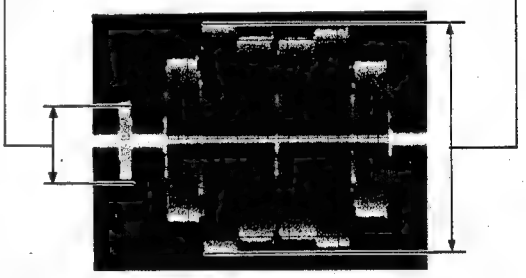
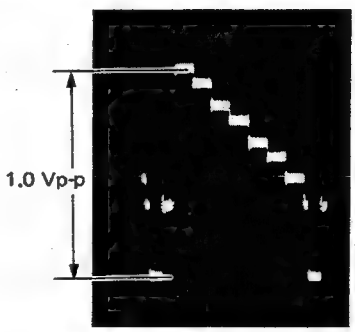


Vectorscope
(75-ohm terminated)

◎ TP15 [F]
Ⓣ GAIN knob of vectorscope

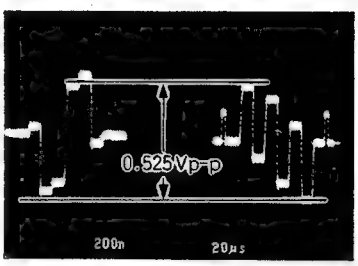
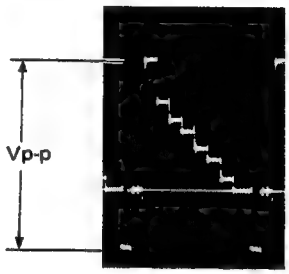
Ⓣ PILOT PHASE (R550) [D]
Ⓣ PILOT LEVEL (R551) [F]
☆ Match the PILOT BURST to the point shown below.



No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure
2	AFC adjustment (for Y/C627 signal)	Oscilloscope (10 : 1, H-rate, DC input)		• Set the Y/C OUTPUT switch to "627" position.
		Composite color bars (test signal generator)	◎ TP18 [F] ⓣ AFC (R552) [E] ☆ 4.4 V ± 0.4 V DC	(1) Adjust to specified value. 
		Frequency counter	◎ TP19 [F] ⓣ VCO (C244) [F] ☆ 4.435572 MHz ± 100 Hz	(2) Reset the J1 to "ADJ" side. (3) Adjust to specified value. (4) Reset the J1 to "FSC" side.
3	Adjusting the output level			• Use 7-pin — BNC conversion connector. • Confirm the Y/C OUTPUT switch is set to "627" position.
			◎ C OUTPUT (7-pin — BNC connector) (75-ohm terminated) ⓣ DUB C LEVEL(R537)[F] ☆ 0.5 Vp-p	(1) Adjust C signal level to the specified value. (2) Set the Y/C OUTPUT switch to "443" position.
			◎ C OUTPUT (7-pin — BNC connector) (75-ohm terminated) ⓣ S-C LEVEL (R528) [D] ☆ 0.3 Vp-p (burst level)	(3) Set the Y/C OUTPUT switch (on the front panel) to the "S-VHS" position. (4) Adjust to the specified level. 
			◎ Y OUTPUT (7-pin — BNC connector) (75-ohm terminated) ⓣ DUB Y LEVEL (R542)[F] ☆ 1.0 Vp-p	(5) Adjust to the specified level. 

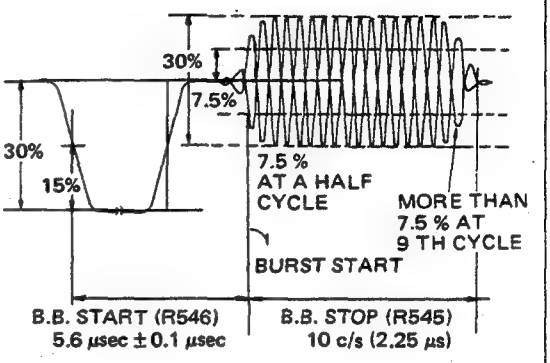
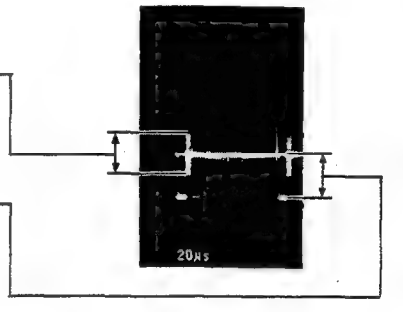
No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (Ⓣ) Adjustment level (☆)	Adjustment procedure

3.8.4 Adjusting the component signals outputs

1	Adjusting the level	Oscilloscope (10 : 1, H-rate) Composite color bars (test signal generator)	◎ R-Y OUTPUT (rear panel) (75-ohm terminated) Ⓣ R-Y LEVEL (R538) [F] ☆ 0.525 Vp-p --- ◎ B-Y OUTPUT (rear panel) (75-ohm terminated) Ⓣ B-Y LEVEL (R539) [F] ☆ 0.525 Vp-p --- ◎ Y OUTPUT (rear panel) (75-ohm terminated) Ⓣ Y LEVEL (R543) [F] ☆ 1.0 Vp-p	(1) Adjust to the specified levels.  R-Y B-Y  After performing this adjustment, these VRs must be paint-locked.

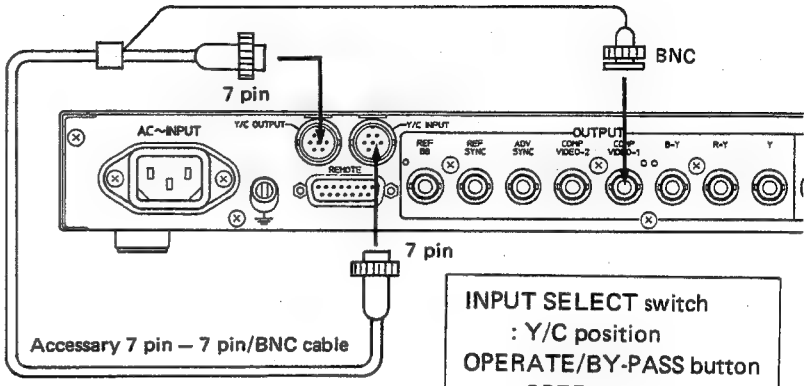
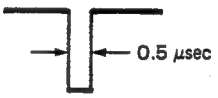
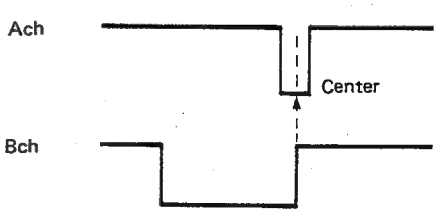
No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment location (ⓣ) Adjustment level (☆)	Adjustment procedure

3.8.5 Adjusting the reference signals outputs (no input signal is necessary)

1	Adjusting the REF B.B. output	Waveform monitor or Oscilloscope (10 : 1, H-rate)	◎ B.B. OUTPUT (rear panel) (75-ohm terminated) ⓣ B.B. STOP (R545) [D] ⓣ B.B. START (R546) [D]	(1) Match them as follows.  (2) Adjust to the specified level. 
			ⓣ B.B. LEVEL (R544) [F] ☆ 0.3 Vp-p (burst level) ◎ B.B.SYNC LEVEL (R536) [B] ⓣ 0.3 Vp-p (Sync level)	

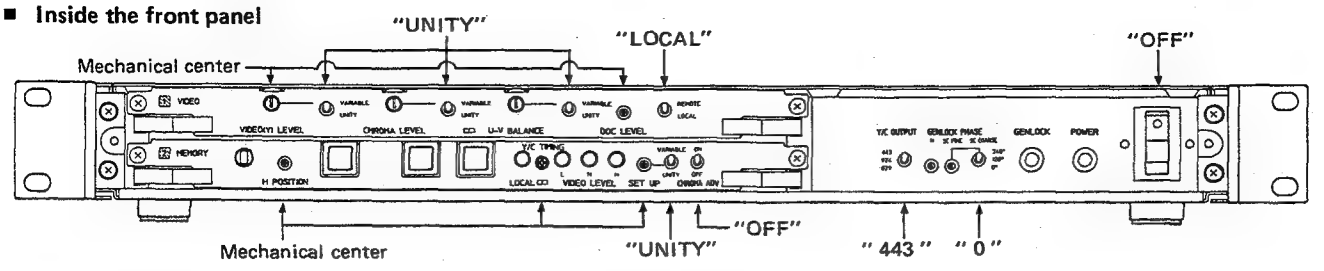
No.	Item	Measuring instruments & Input signals	Measuring point (◎) Adjustment parts (①) Adjustment level (☆)	Adjustment procedure

3.9 ADJUSTING THE PB DET BOARD (No signal is necessary.)

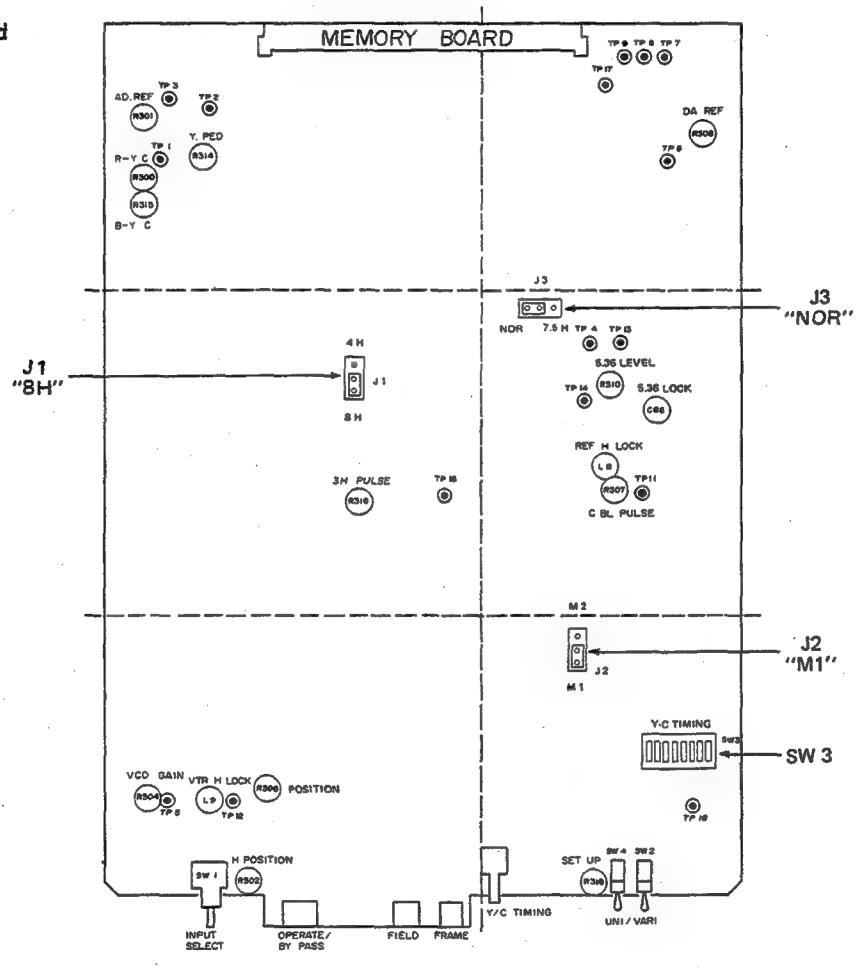
1	Adjusting the pulse width	Oscilloscope (H-rate, 10 : 1)	 ◎ IC3-⑨ pin [PB DET board] ① WIDTH (R20) [PB DET board] ☆ 0.5 μsec width	INPUT SELECT switch : Y/C position OPERATE/BY-PASS button : OPERATE mode (1) Set the pulse width to the specified value. 
2	Adjusting the detection point		◎ IC3-⑨ pin [PB DET board] → Ach ◎ IC3-⑦ pin [PB DET board] → Bch ① DETECT (R22) [PB DET board] ☆ Set the rising timing	(2) Connect an oscilloscope. (3) Set the rise timing of pulse at Bch to the position shown below. 

3.10 SETTINGS OF SWITCHES AND CONNECTORS WHEN THE UNIT IS TO BE SHIPPED

■ **Inside the front panel**



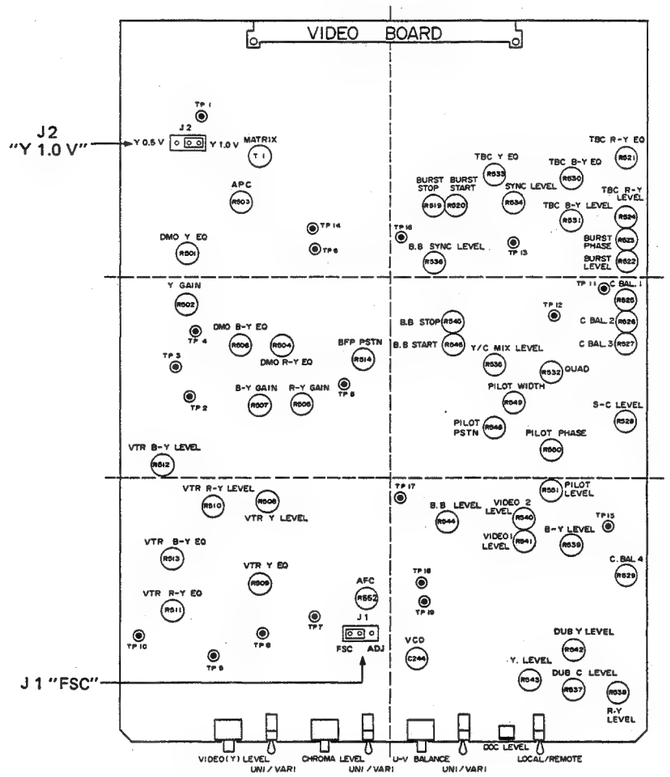
■ **On the MEMORY board**



Notes:

- J1 : Phase switching connector of the advance sync pulse to be output from the ADV SYNC connector on the rear panel.
  4H: Phase advanced by 4H with respect to the reference sync signal to be output from REF SYNC on the rear panel.
  8H: Phase advanced by 8H with respect to the reference sync signal output.
- J2 : Switching connector for the DOC mode. The operations while the VTR is in the playback mode in modes 1 and 2 are basically the same; however, in case the video signal has interrupted such as when the VTR has stopped, the operation will change as follows.
  Mode 1 : The monitor screen enters the no-signal mode after the VTR has stopped.
  Mode 2 : On the monitor screen, the picture immediately before stop is kept frozen until a new video signal is input.
- J3 : Selecting connector for C BL pulse.
  NOR : Factory set position
  7.5H : Set to this position to input video signal containing VITC signal.
- SW3 : This switch adjusts the timings of the Y signal and C signal when video signal data is input to frame MEMORY BOARD. Normally, do not tamper with this switch.

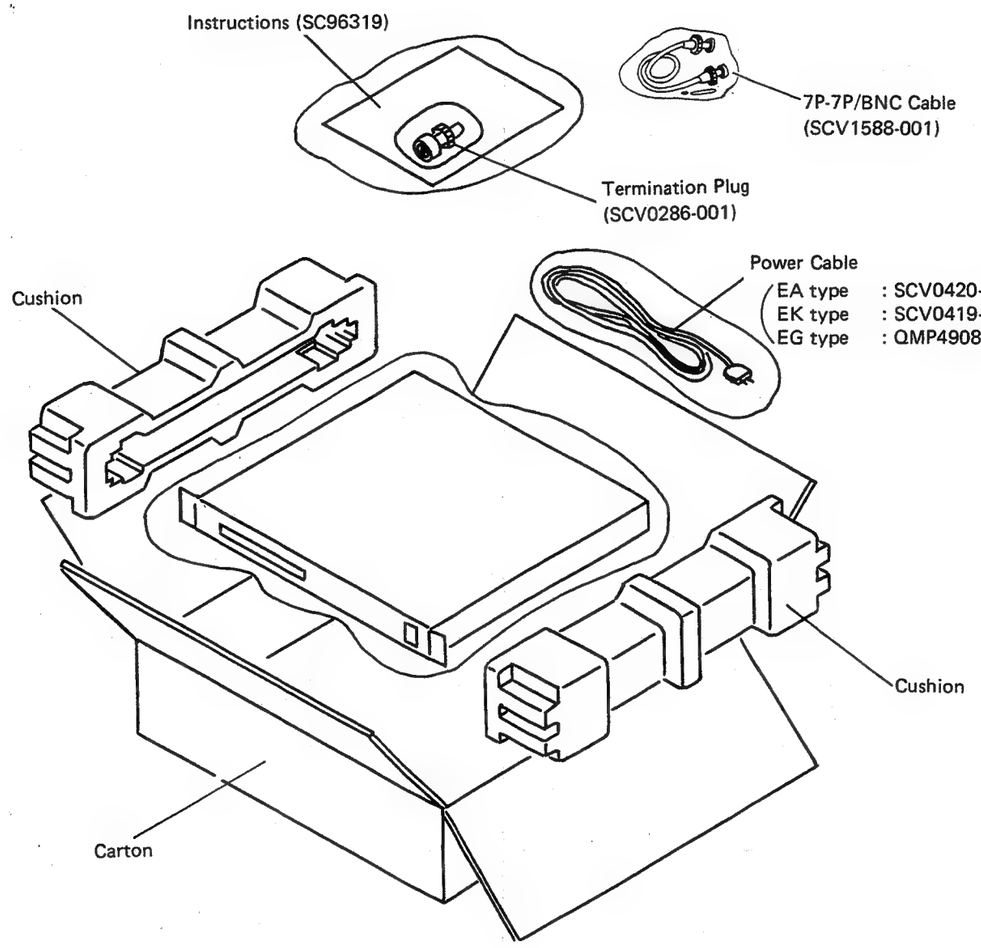
■ **On the VIDEO board**



Notes: • J1 : Used for servicing.
FSC : Factory set position
ADJ : When performing 3.8.3 "Adjusting the Y/C signal output", set this side.
After adjustment, never forget to reset the connector to FSC side.

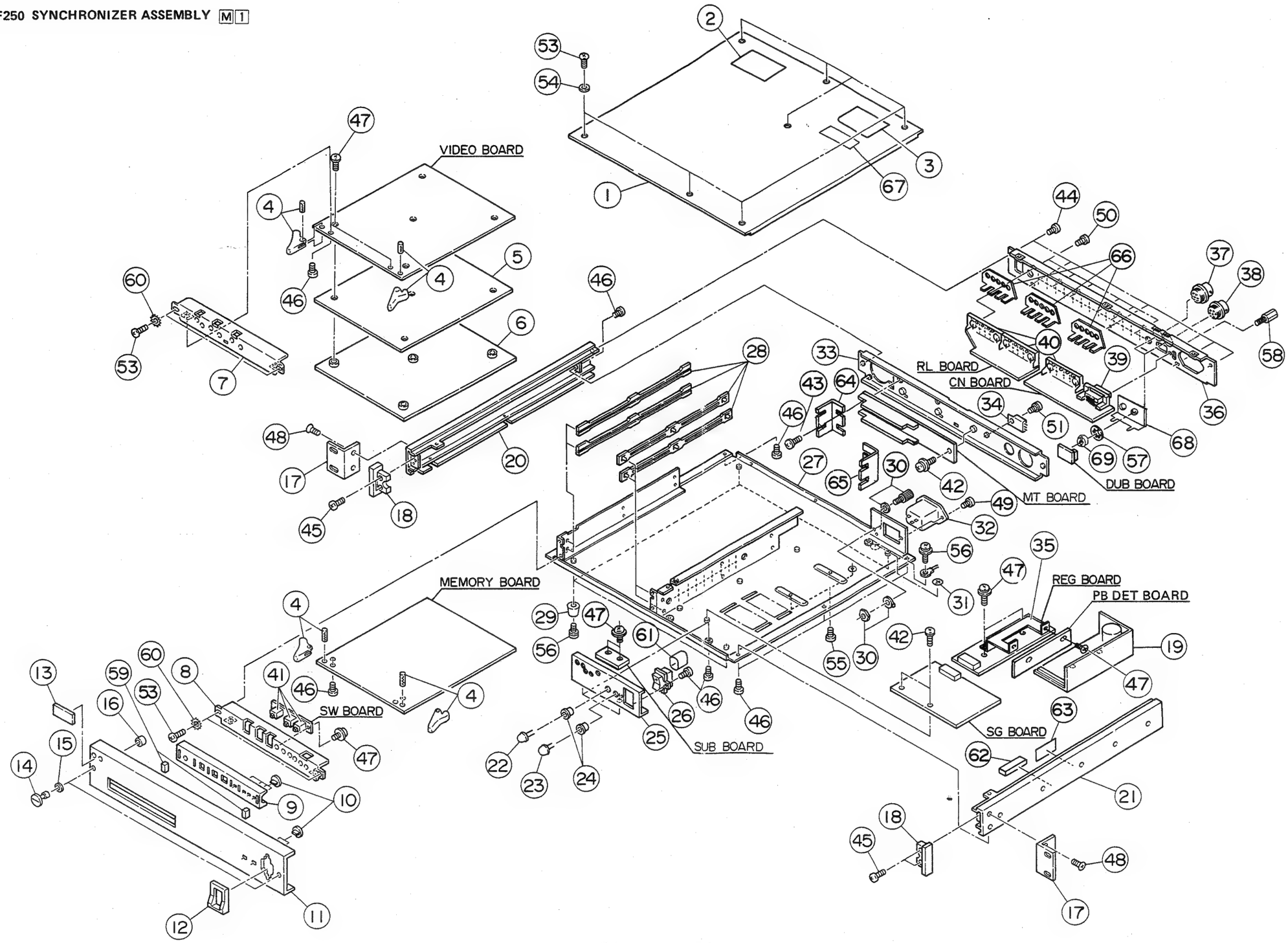
• J2 : Y (Y/C) level setting connector.
Y 1.0 V : For inputting the Y/C 443 signal.
Y 0.5 V : For inputting the Y/C 924 or Y/C 627 signal.

SECTION 4
REPACKING



SECTION 5
EXPLODED VIEW AND PARTS LIST

5.1 KM-F250 SYNCHRONIZER ASSEMBLY [M] [1]



SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

● Frame Synchronizer assembly parts list M1 M1MM□□□□

Symbol No.	Part No.	Part Name	Description
1	SC20329-001	Upper Cover	
2	SC41058-002	Caution Label	
3	Not Available	Name Plate	
4	SCV0296-001	Lever	
⚠ 5	SC31009-001	Insulator	
6	SC31008-00B	Shield Plate	
7	SC31007-00B	Panel	1 VIDEO
8	SC31006-00B	〃	2 MEMORY
9	SC31010-001	Escutcheon	} Escutcheon assembly SCM0244-00A
10	SM40303-002	LED Lens	
11	SC20328-001	Front Panel	
⚠ 12	SC42025-001	Switch Guide	
13	Not Available	JVC Logo Mark	
14	SC40703-001	Screw	
15	SC40724-001	Spacer	
16	SC43372-001	Stopper	
17	SC43373-001	Side Bracket	
18	SC31011-001	Side Escutcheon	
⚠ 19	SCV1508-002	Power Supply Unit	
20	SC20322-00A	Left Chassis	
21	SC20322-00B	Right Chassis	
22	GL-5PG22	LED (Green)	GENLOCK
23	GL-5HD22	LED (Red)	POWER
24	SM3512	LED Holder	
25	SC31005-00B	Switch Panel	
⚠ 26	QSE2A21-S03	Power Switch	POWER
27	SC10069-00B	Bottom Chassis	
⚠ 28	SCV1212-001	Rail	
29	E47227-006	Foot	
30	E03619-001	GND Terminal Assembly	GND
⚠ 31	SC40855-001	Earth Label	⏚
⚠ 32	SSV0577	AC Receptacle	
33	SC20324-00A	Rear Chassis	
34	TA78009AP	IC	9V Regulator
⚠ 35	SC44056-001	Bracket	
36	SC20325-002	Rear Panel	
⚠ 37	SCV1213-001	Connector (7P)	Y/C INPUT
⚠ 38	SCV1214-002	〃 (7S)	Y/C OUTPUT
⚠ 39	SCV1215-S15	〃 (15S)	REMOTE
⚠ 40	SCV1027	BNC Connector	INPUT, OUTPUT
41	Refer to "7.7 MEMORY BOARD assembly" SW BOARD assembly.		OPERATE/BY-PASS, FIELD, FRAME
42	LPSP2606Z	Screw	M2.6 × 6
43	SDSP2610Z	〃	M2.6 × 10
44	SBST3006M	〃	M3 × 6
45	SDSP3006M	〃	M3 × 6
46	SBST3006Z	〃	M3 × 6
47	DPSP2606Z	〃	M2.6 × 6
48	SSSP3008N	〃	M3 × 8
49	SBST3008M	〃	M3 × 8
50	SBSF3008M	〃	M3 × 8
51	LPSP3006Z	〃	M3 × 6
52	—	—	
53	SDSP3006R	Screw	M3 × 6
54	Q03093-115	Washer	
55	DPSP3006Z	Screw	M3 x 6

Symbol No.	Part No.	Part Name	Description
56	LPSP4006Z	Screw	M4 × 6
57	Not Available	Washer	Included ㊲, ㊳
58	〃	Screw	Included ㊴
59	SC43443-001	Spacer	
60	WBS3000N	Washer	
⚠ 61	SCV1327-001	Switch Cover	
62	SC43021-003	Cushion	
63	SC41252-001	Label	
64	SC43442-001	Bracket	
65	SC43442-002	〃	
66	SC43492-001	Plate	
67	SC40865-001	Label	"E" version only
68	SC43638-001	Plate	
69	SC43805-001	Nut	

SECTION 6
CHARTS AND DIAGRAMS

SCHEMATIC DIAGRAM NOTES

• Schematic safety precaution

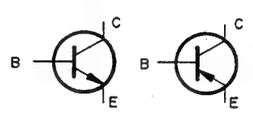
▒▒ parts are safety related parts.
When replacing them, be sure to use the specified parts.

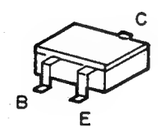
Voltage: Measured with digital voltmeter in DC range;
Input — Color bars signal from test signal generater. (VBS, Full bars and 75% White peak)

Waveform: Measured with oscilloscope;
Input — Color bars signal from test signal generater. (VBS, Full bars and 75% White peak)

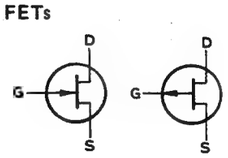
• Chip transistors and FETs

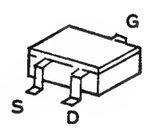
Transistors





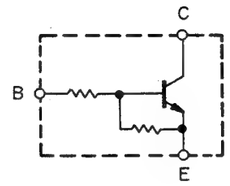
FETs





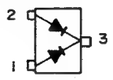
• Digital Transistor

DTC124K

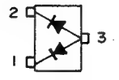


• Chip diodes

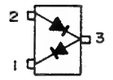
MA152WK



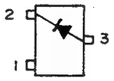
MA152WA

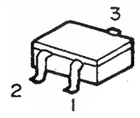


MA153



MA152A





REPLACING SUBMINIATURE "CHIP" PARTS

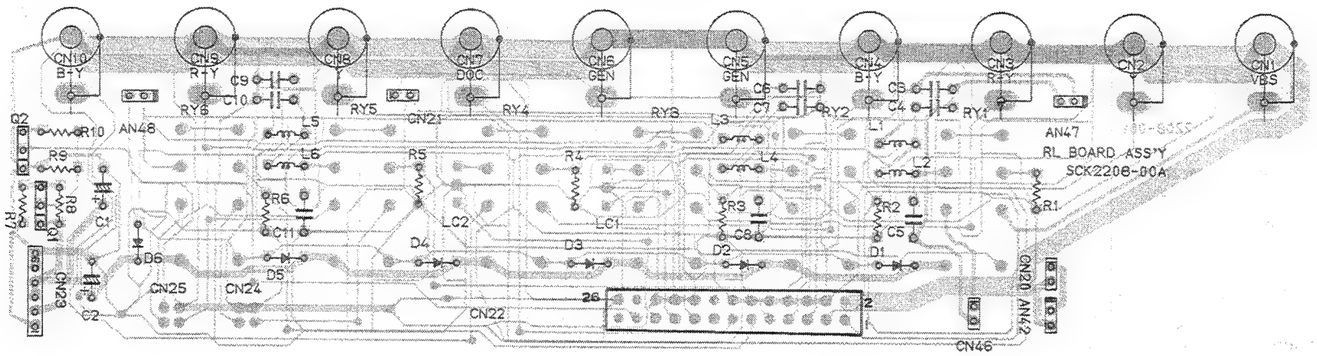
- Some resistors, shoring jumpers (0 Ω resistance), ceramic capacitors, transistors, and diodes are chip parts. These chip parts cannot be reused after they are once removed.
- Soldering cautions:
  1) Do not apply heat for more than 3 seconds.
  2) Avoid using a rubbing stroke when soldering.
  3) Discard removed chips; do not reuse them.
  4) Supplementary cementing is not required.
  5) Use care not to scratch or otherwise damage the chips.
- Resistors and capacitors are not interchangeable with chip parts which is used in the color cameras BY-110, KY-210, etc., because of size difference. In case of part order, refer to the section "ELECTRICAL PARTS LIST".

6-1

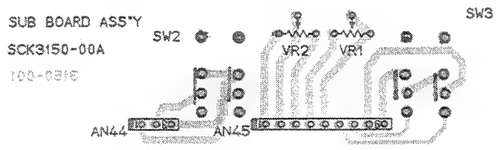
6.1 RL/CN/REG/MT/SUB CIRCUIT BOARDS

SCK5174-00A

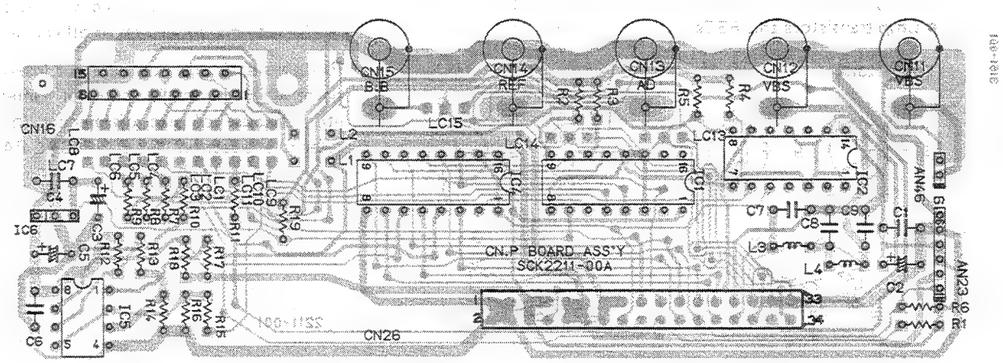
— RL board —



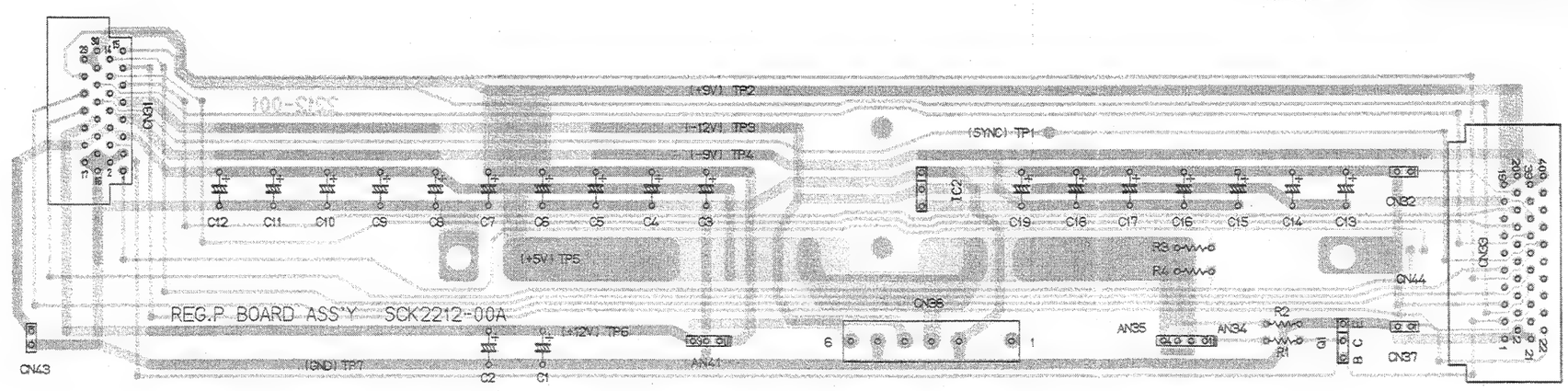
— SUB board —



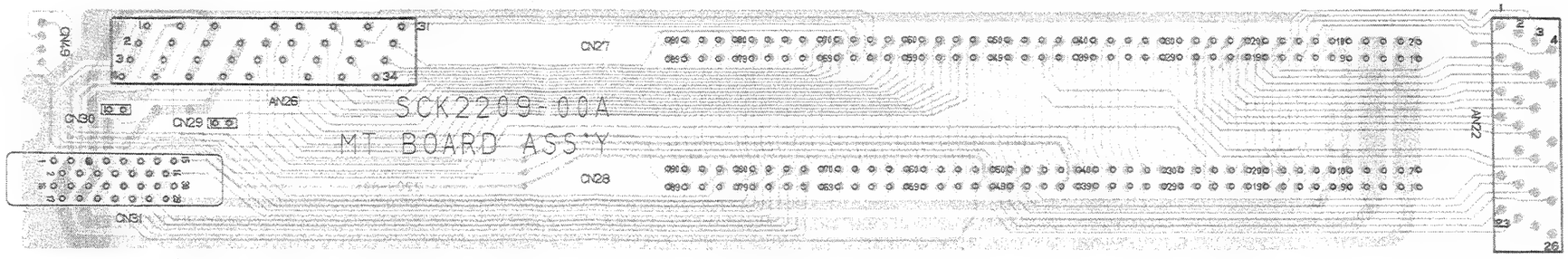
— CN board —



— REG board —

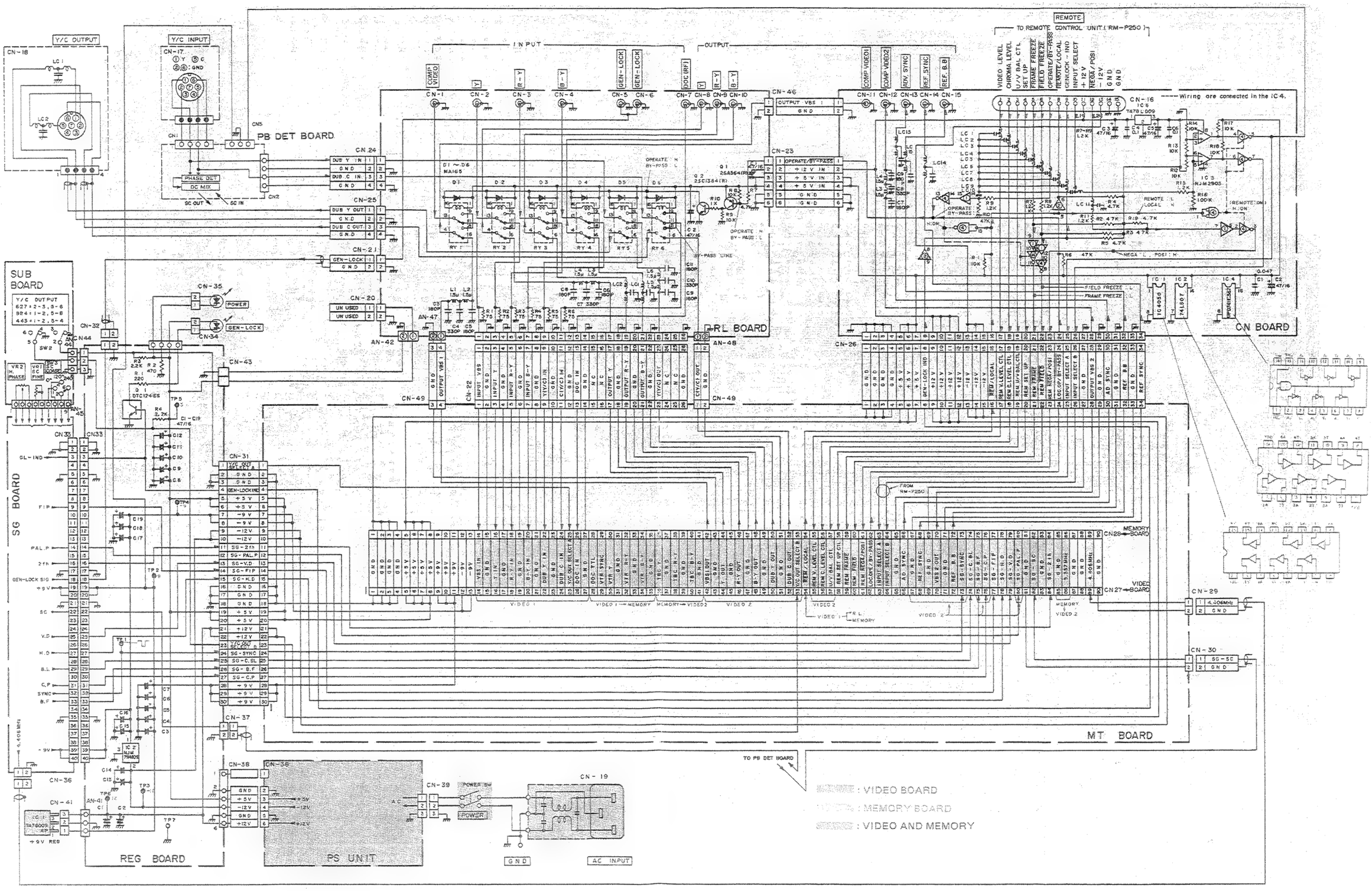


— MT board —

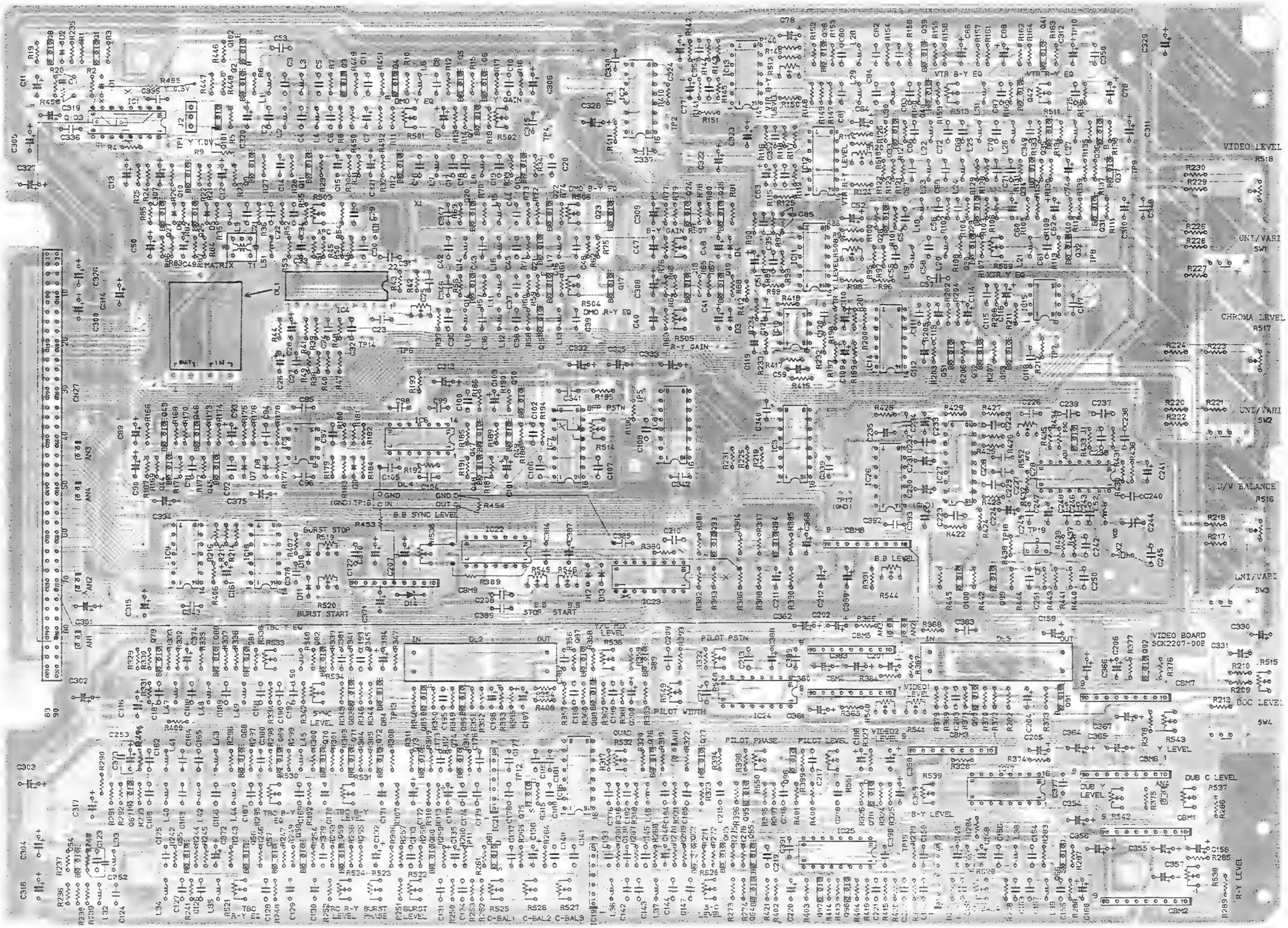


6-2

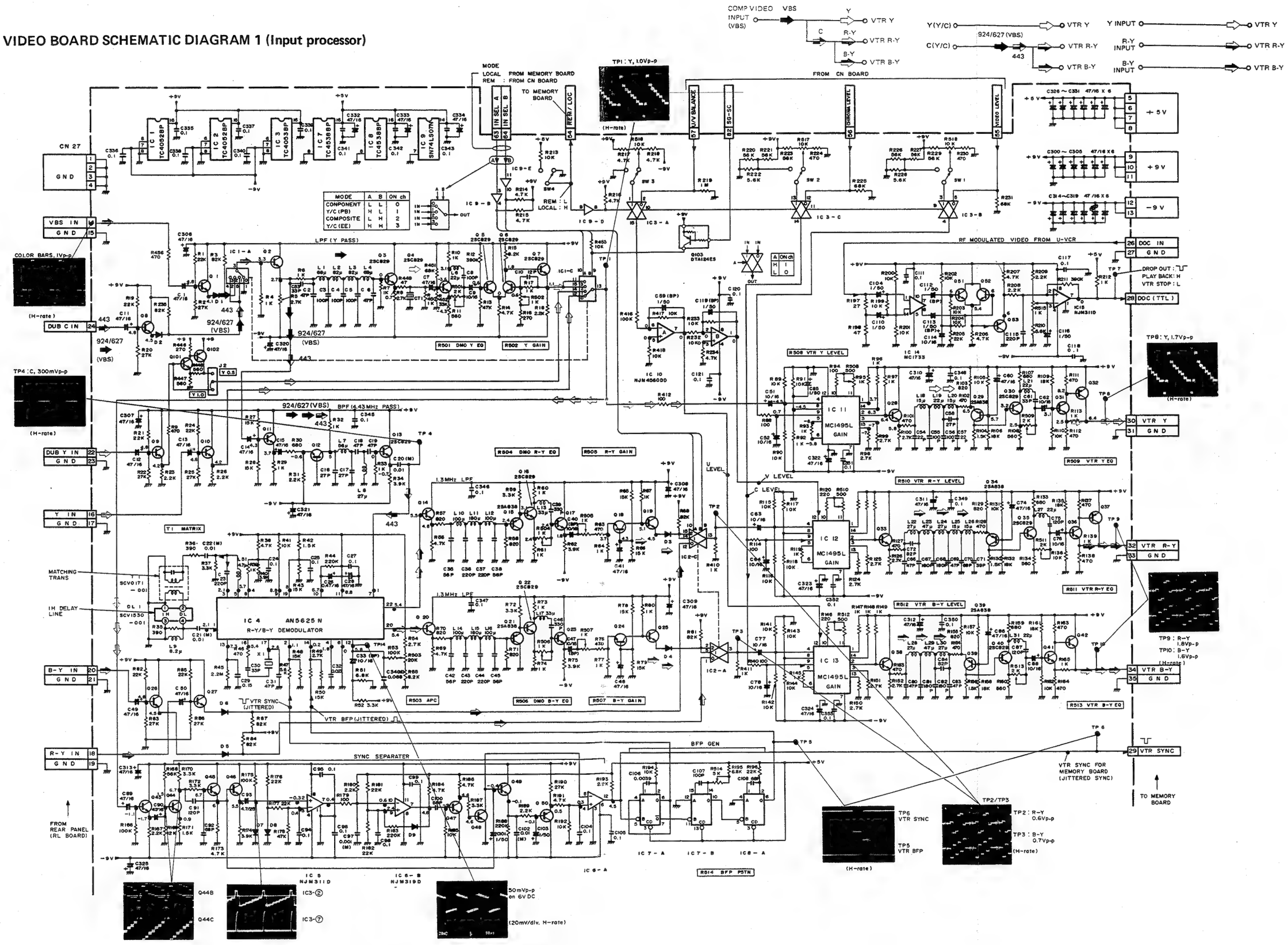
6.2 OVERALL WIRINGS



6.3 VIDEO CIRCUIT BOARD



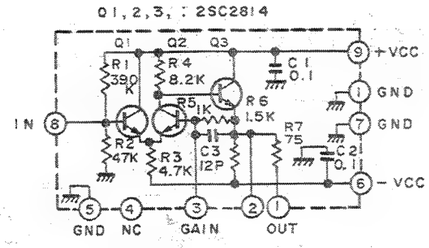
6.4 VIDEO BOARD SCHEMATIC DIAGRAM 1 (Input processor)

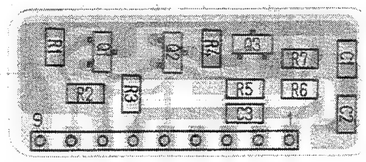


6-5

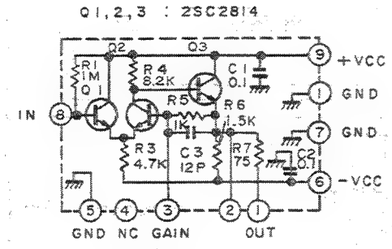
6.5 VIDEO BOARD CBM CHARTS AND DIAGRAMS

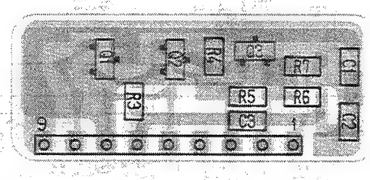
● CBM1/CBM3/CBM5/CBM6/CBM8 OUT-1 CBM (Output processor) [CBMC4240-00A]



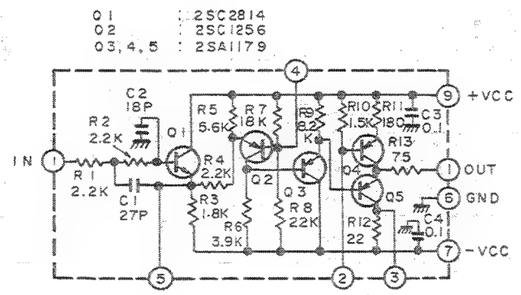


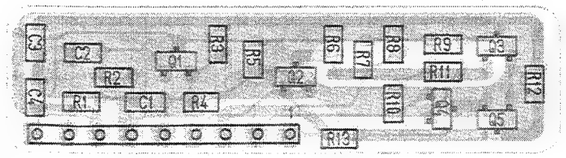
● CBM2/CBM4/CBM7 OUT-2 CBM (Output processor) [CBMC4240-00B]





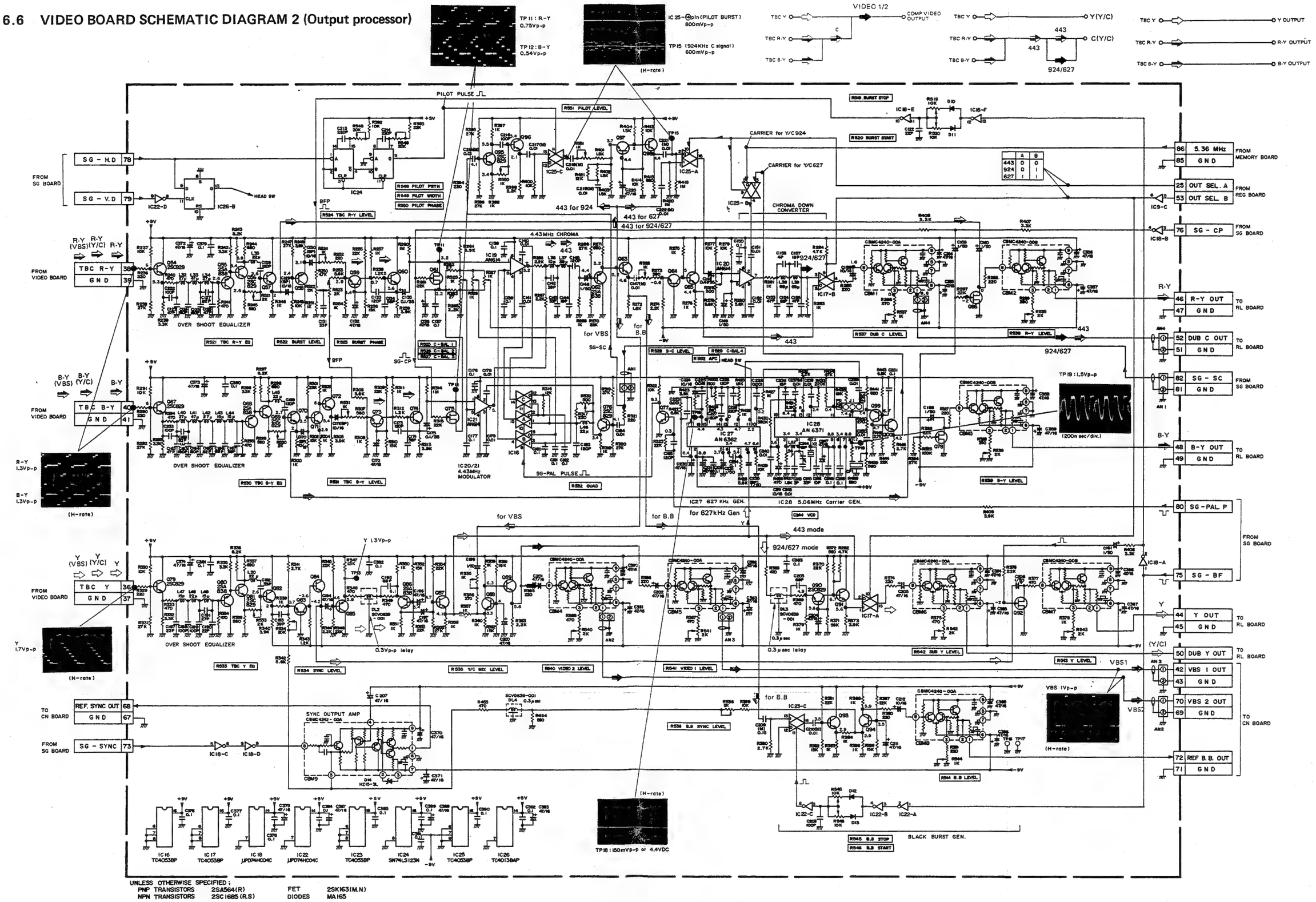
● CBM9 SYNC AMP CBM (Output processor) [CBMC4242-00A]





6-6

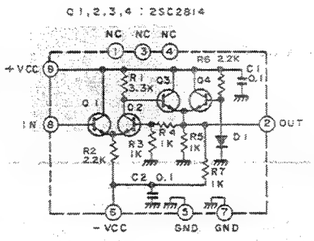
6.6 VIDEO BOARD SCHEMATIC DIAGRAM 2 (Output processor)

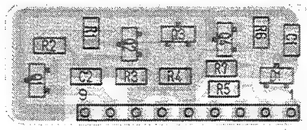


6-7

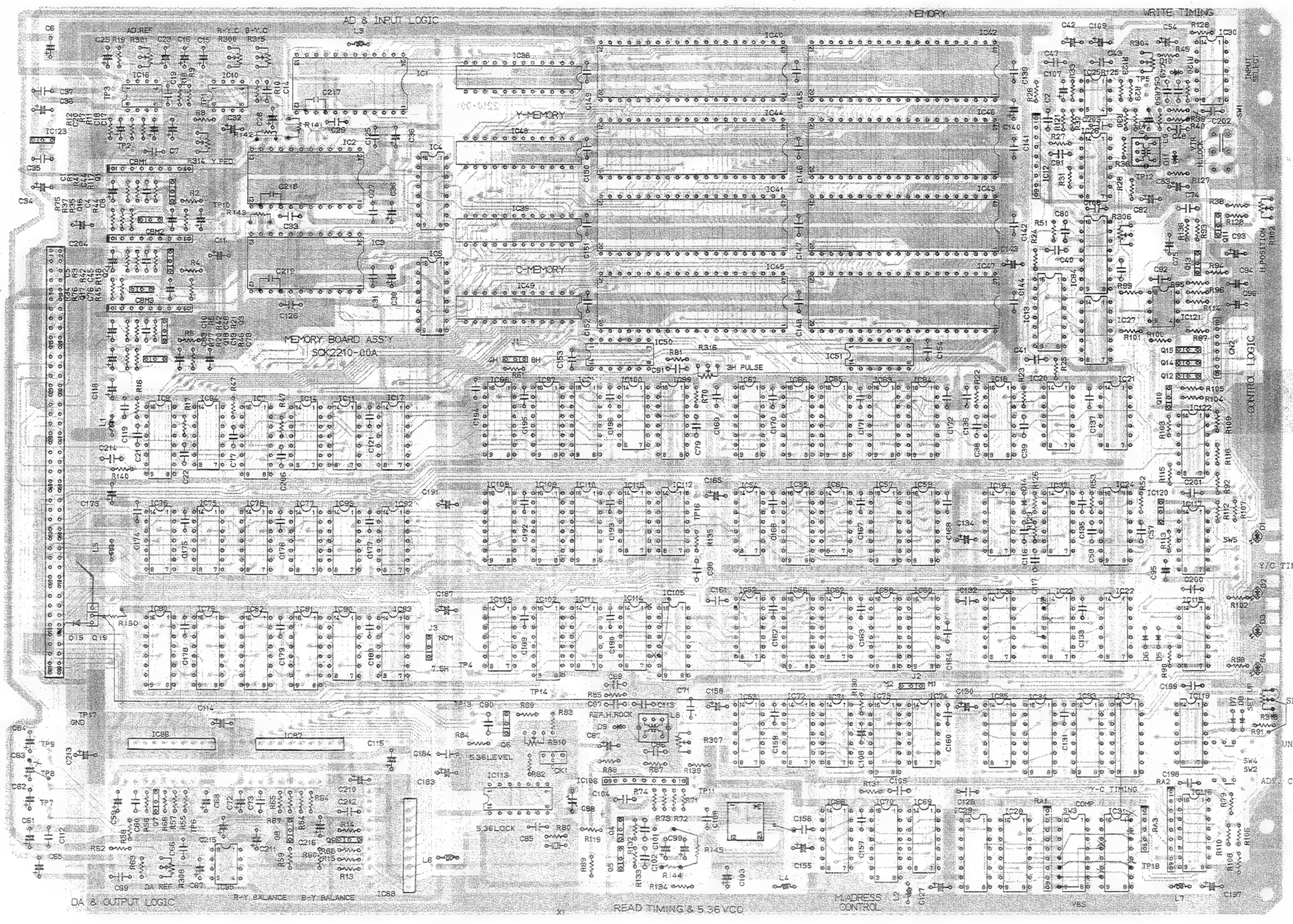
6.7 MEMORY CIRCUIT BOARD

● CBM1/CBM2/CBM3
VIDEO AMP CBM
[CBMC4241-00A]

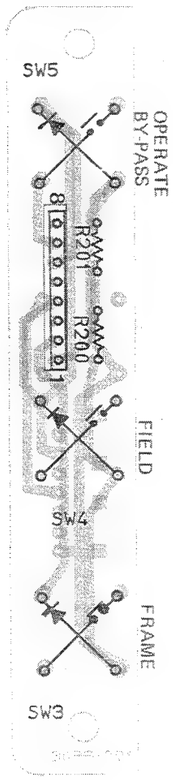




– MEMORY board –

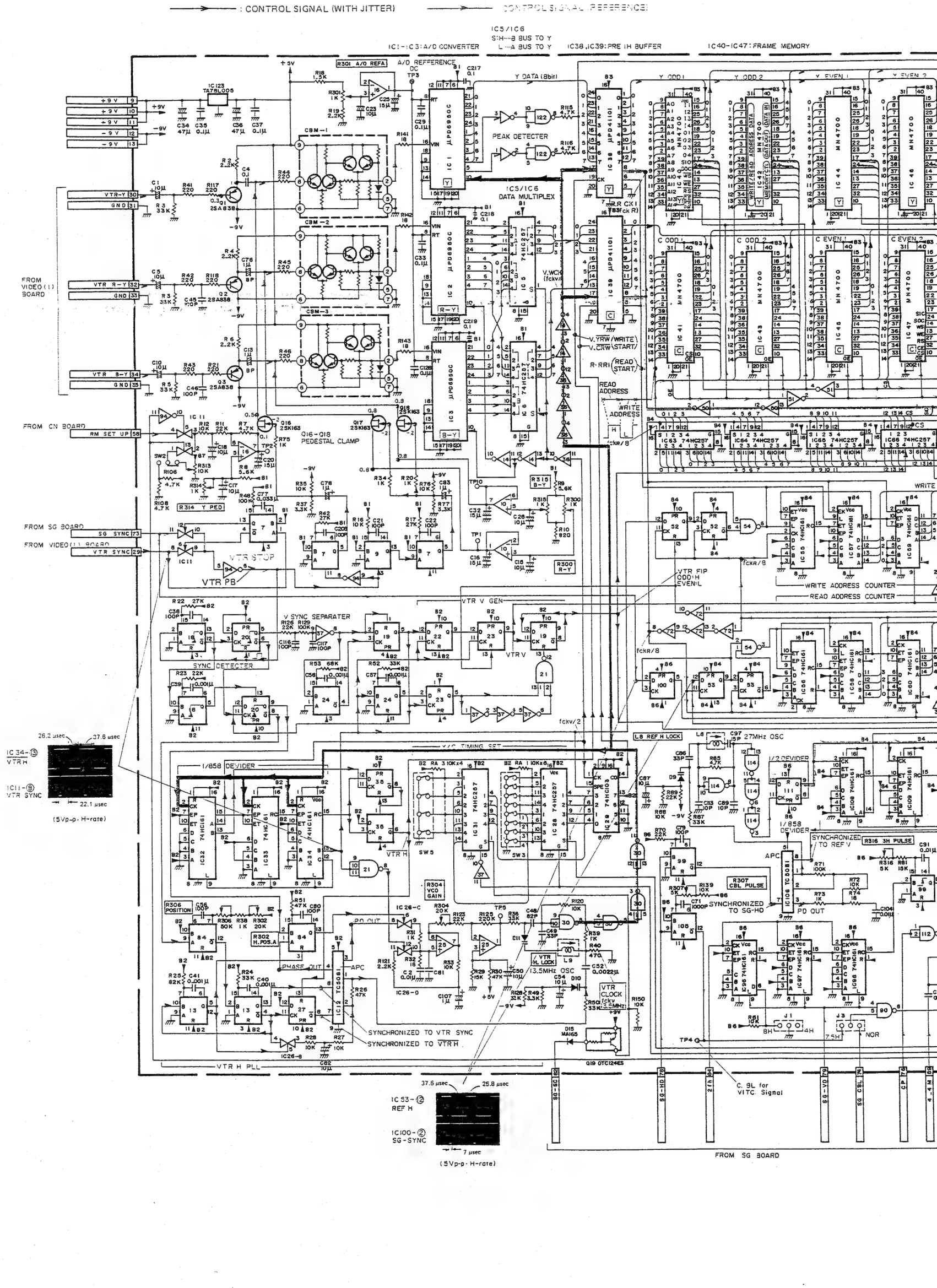


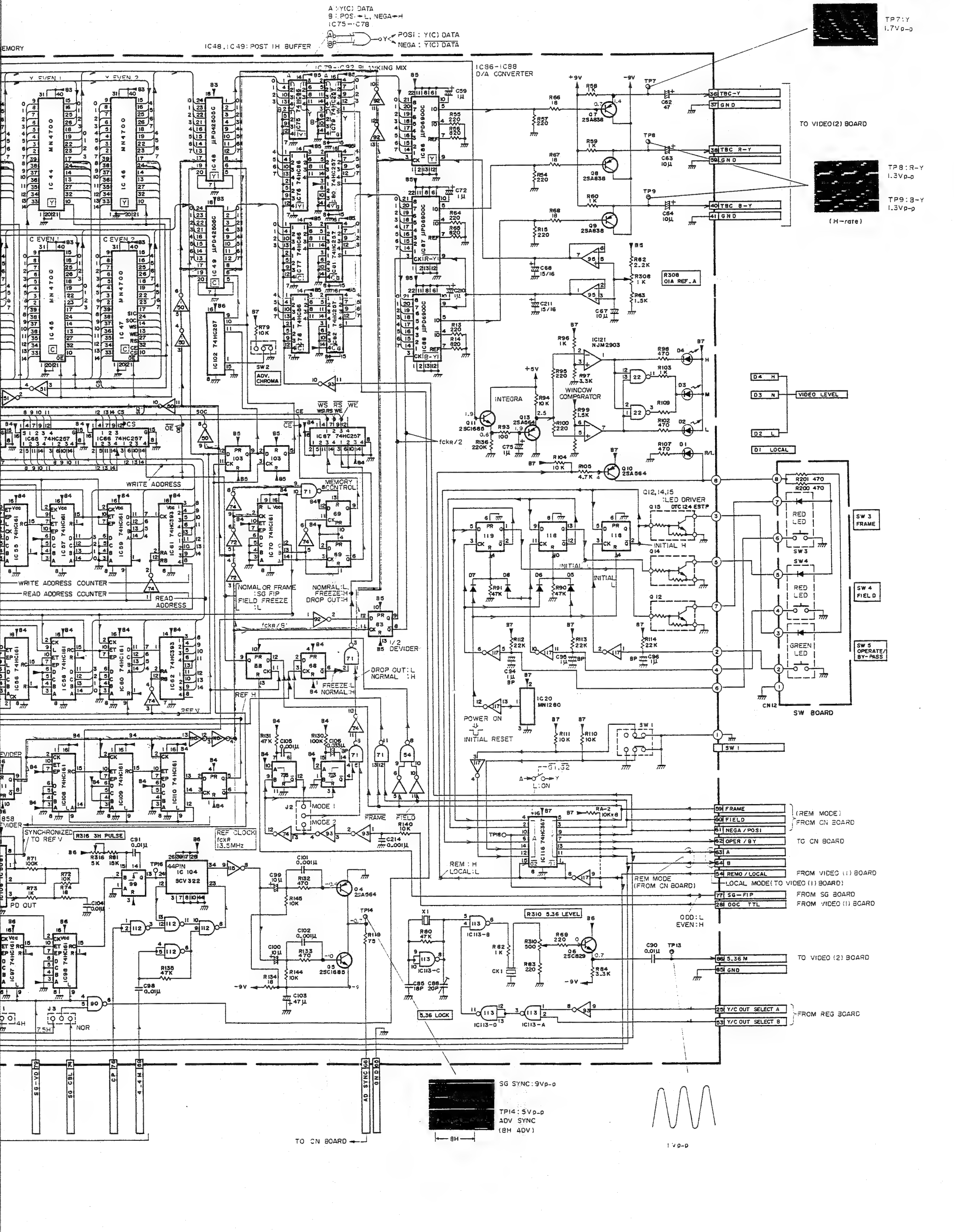
– SW board –



6-8

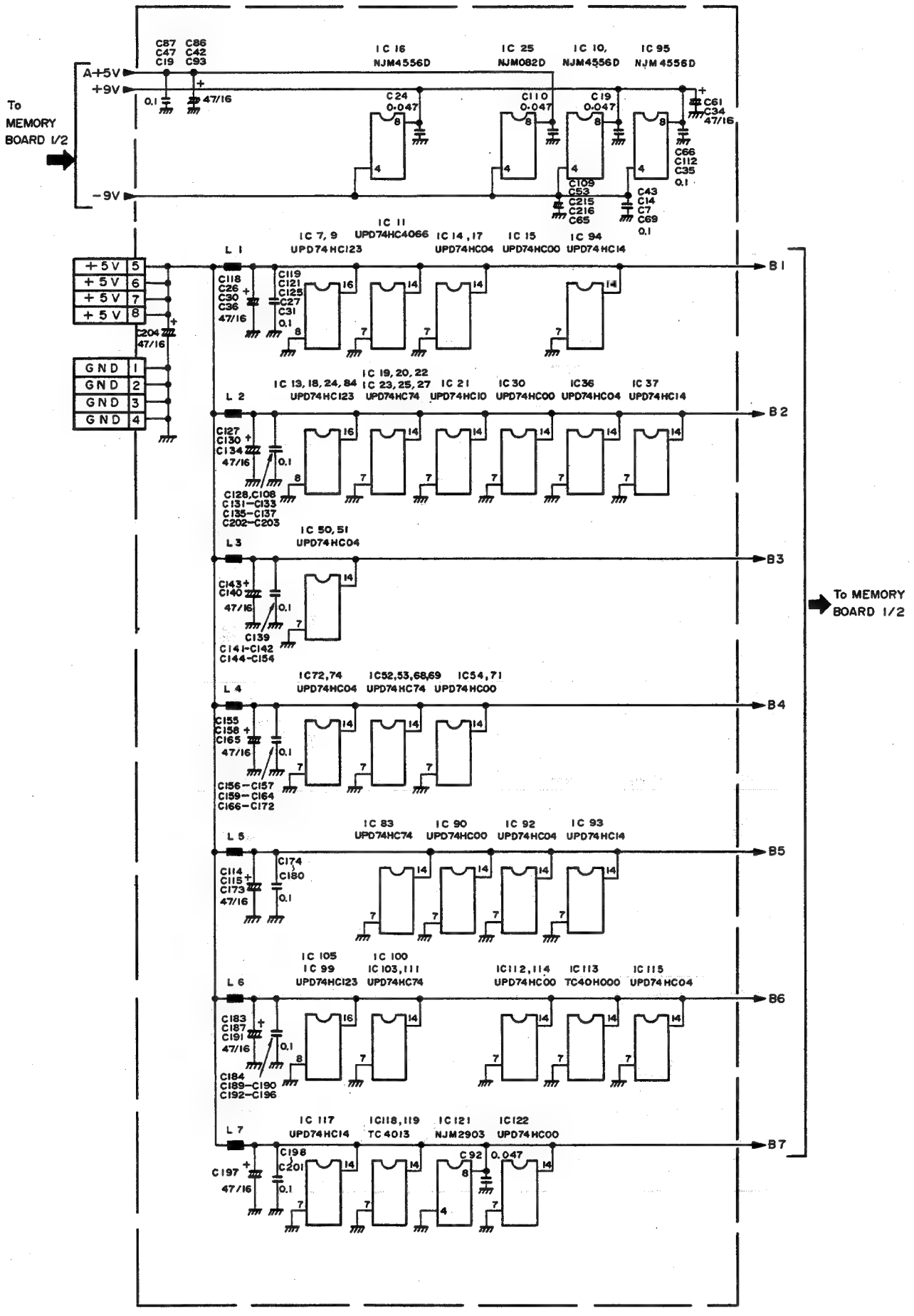
6.8 MEMORY BOARD SCHEMATIC DIAGRAM 1



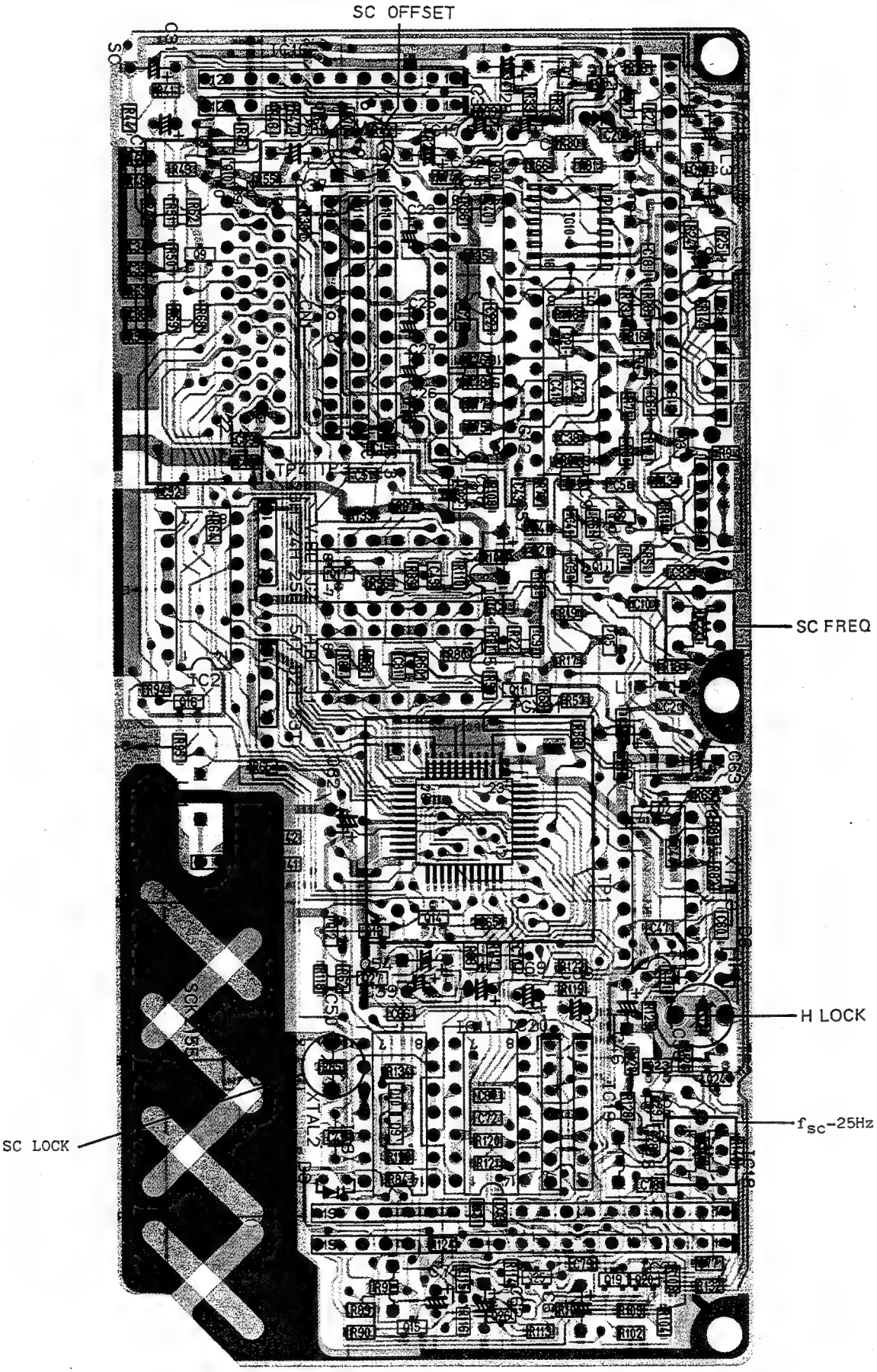


A: Y(C) DATA
B: POS→L, NEGA→H
IC75~C78
POSI: Y(C) DATA
NEGA: Y(C) DATA
IC48, IC49: POST 1H BUFFER
IC79~IC82 BLANKING MIX
IC86~IC88
D/A CONVERTER
TP7: Y
1.7Vp-p
TO VIDEO(2) BOARD
TP8: R-Y
1.3Vp-p
TP9: B-Y
1.3Vp-p
(H-rate)
R308
D/A REF_A
INTEGRA
WINDOW
COMPARATOR
VIDEO LEVEL
LOCAL
Q12,14,15
:LED DRIVER
WRITE ADDRESS
MEMORY
CONTROL
WRITE ADDRESS COUNTER
READ ADDRESS COUNTER
READ
ADDRESS
NOMAL OR FRAME
:SG FIP
FIELD FREEZE
:L
NOMRAL:L,
FREEZE:H
DROP OUT:H
1/2
DEVIDER
DROP OUT:L
NORMAL :H
FREEZE:L
NORMAL:H
REF H
POWER ON
INITIAL RESET
SW BOARD
SW 3
FRAME
SW 4
FIELD
SW 5
OPERATE/
BY-PASS
RED
LED
GREEN
LED
(REM MODE:
FROM CN BOARD
TO CN BOARD
REM MODE
(FROM CN BOARD)
FROM VIDEO (1) BOARD
LOCAL MODE (TO VIDEO (1) BOARD)
FROM SG BOARD
FROM VIDEO (1) BOARD
ODD:L
EVEN:H
TO VIDEO (2) BOARD
FROM REG BOARD
REM: H
LOCAL: L
R310 5.36 LEVEL
5.36 LOCK
SYNCHRONIZED
TO REF V
R316 3H PULSE
REF CLOCK
fckR
13.5MHz
PD OUT
TO CN BOARD
SG SYNC: 9Vp-p
TP14: 5Vp-p
ADV SYNC
(8H ADV)
1Vp-p

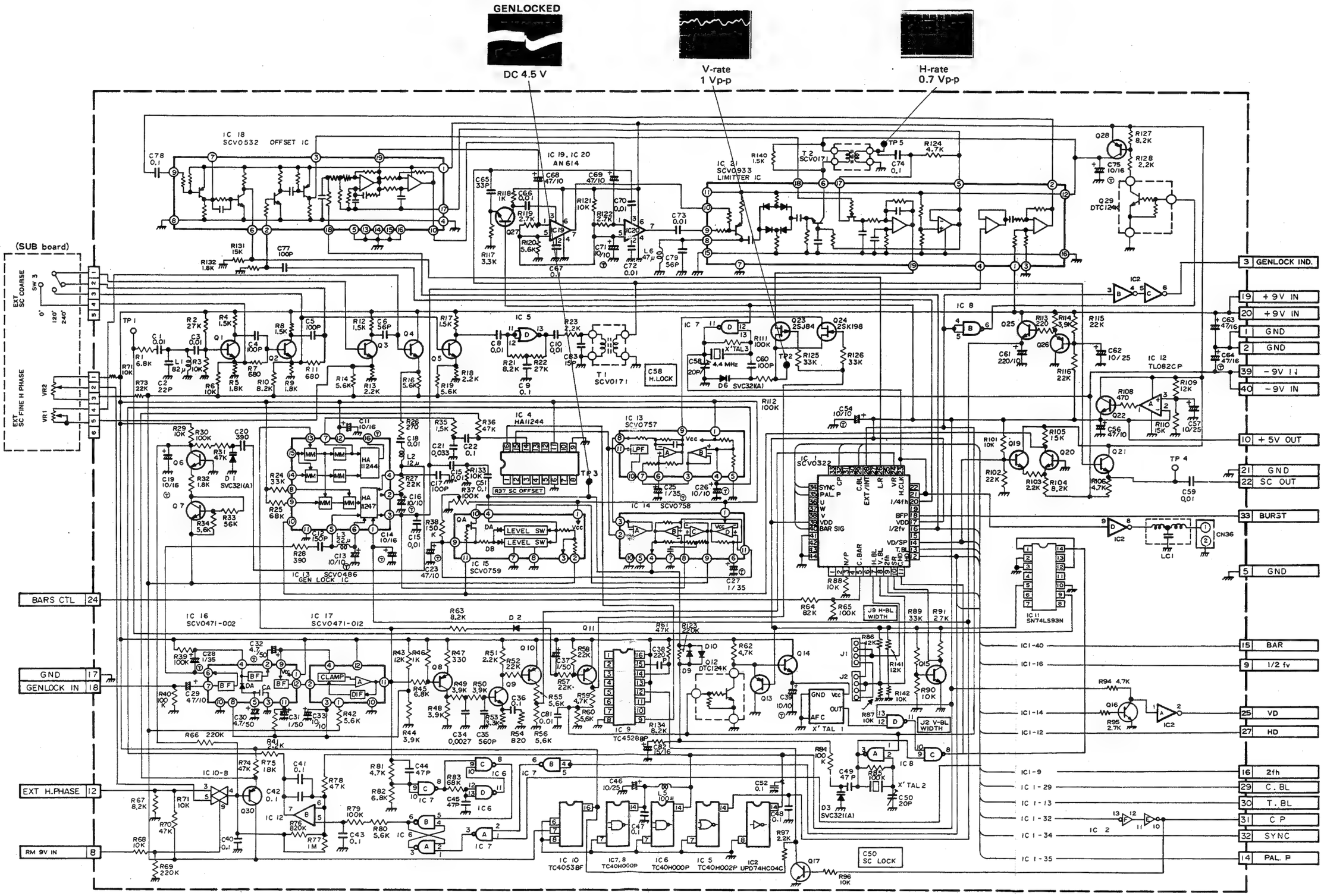
6.9 MEMORY BOARD SCHEMATIC DIAGRAM 2



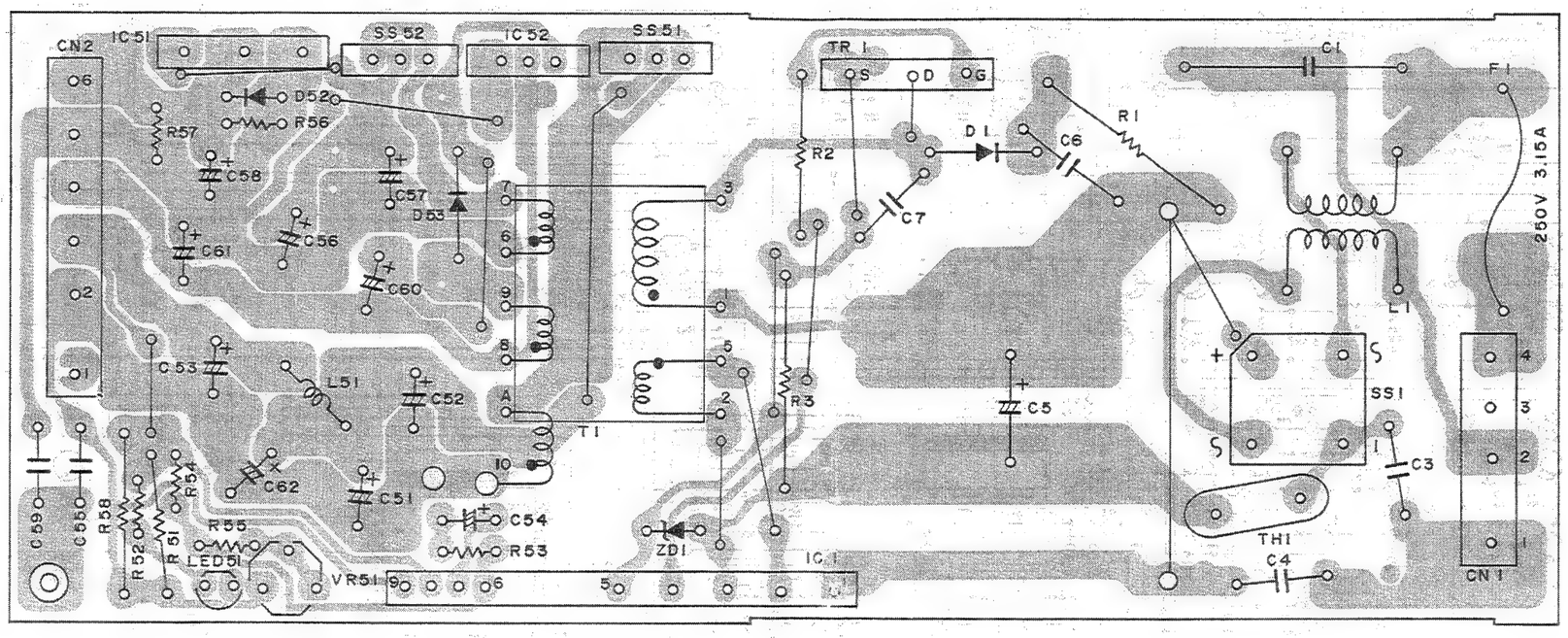
6.10 SG CIRCUIT BOARD



6.11 SG BOARD SCHEMATIC DIAGRAM

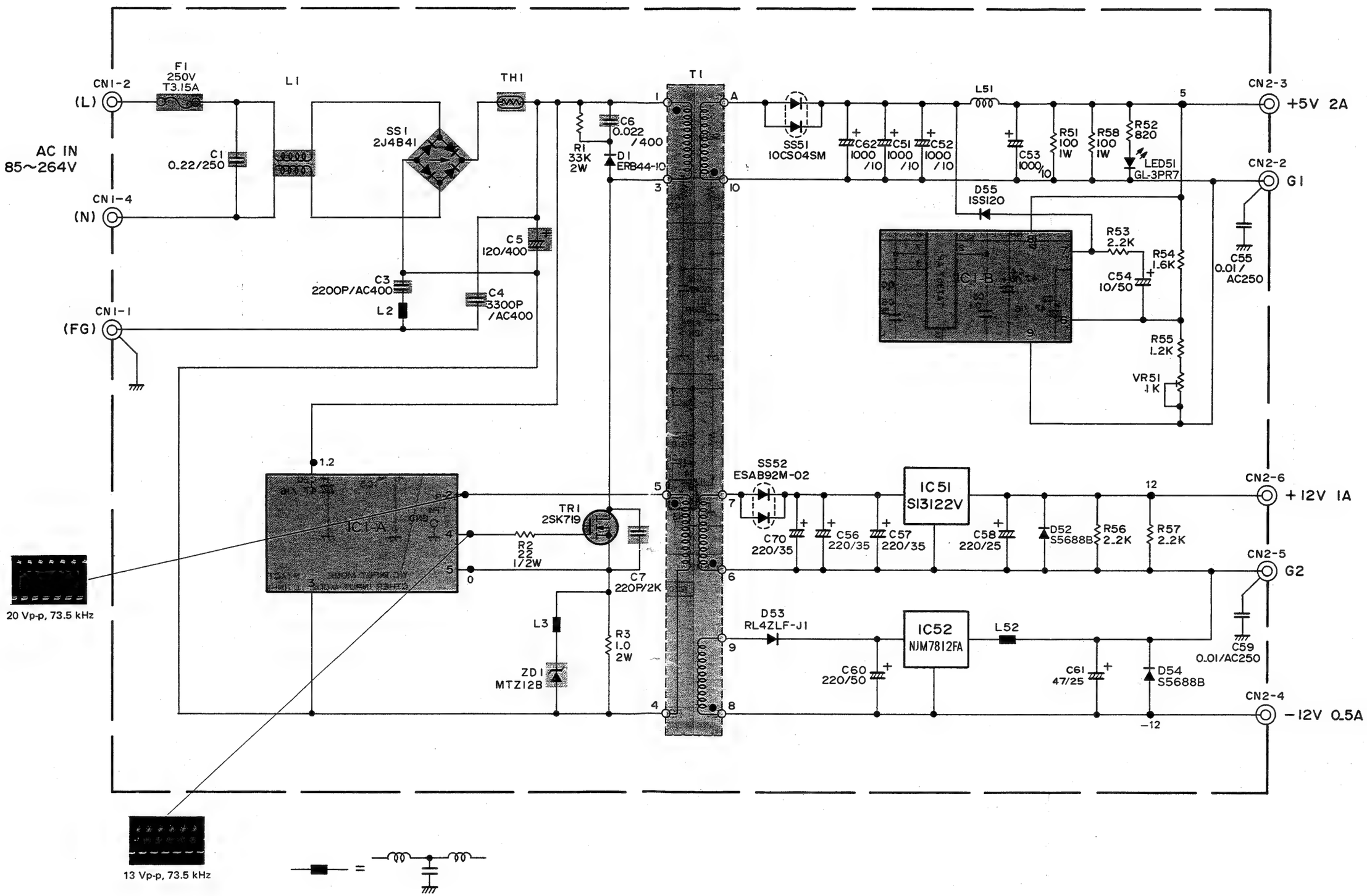


6-12

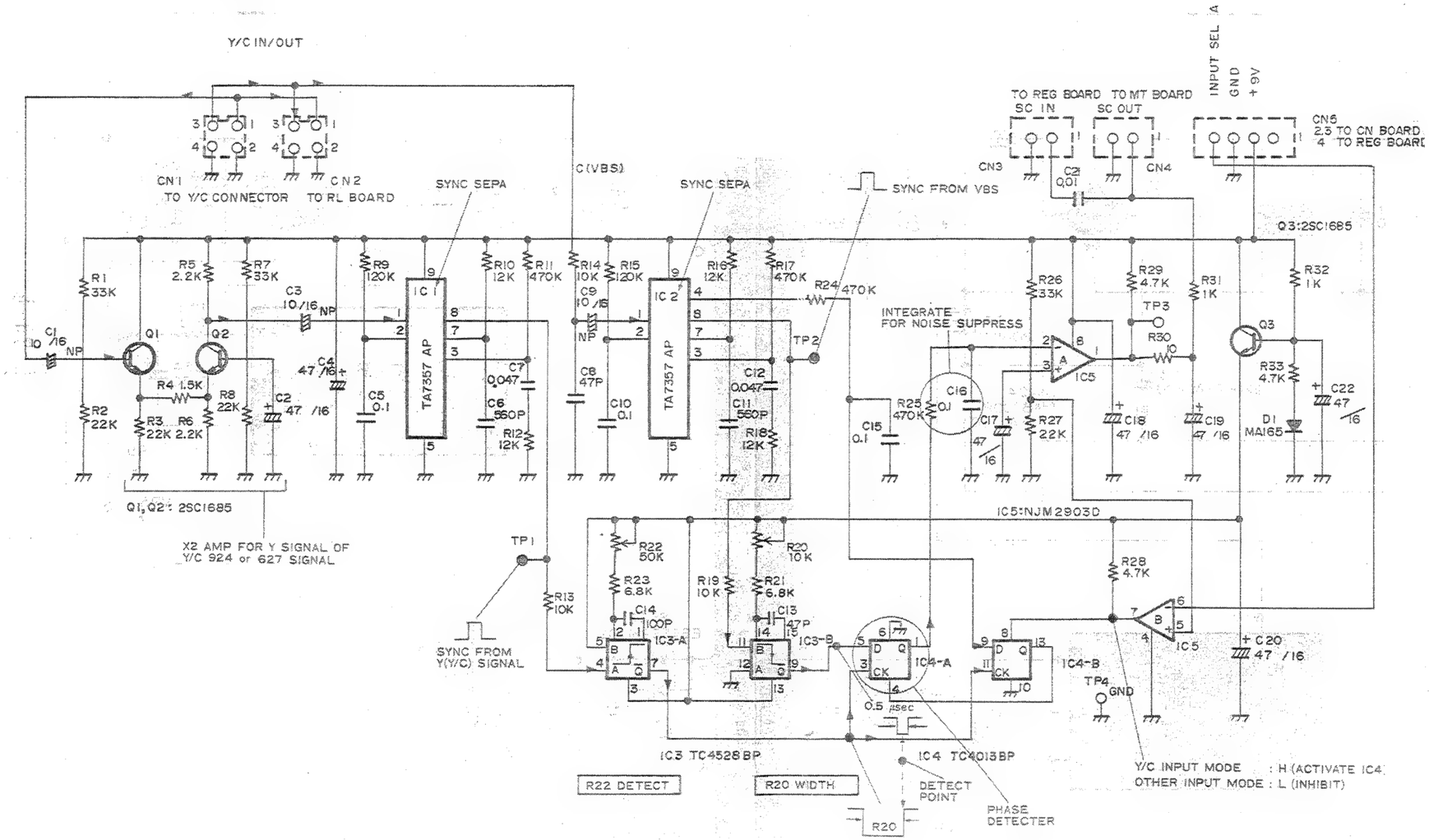

CN2
IC51
SS52
IC52
SS51
TR1
S
D
G
CI
FI
250V 3.15A
D52
R56
R57
C58
C57
D53
C56
C61
C60
R2
D1
C6
R1
C7
L1
C53
L51
C52
A
T1
R3
C5
SS1
S
1
C3
THI
C4
CN1
4
3
2
1
C59
C55
R58
R52
R51
R54
C62
C51
10
R55
LED51
VR51
C54
R53
ZD1
IC1
9
6
5

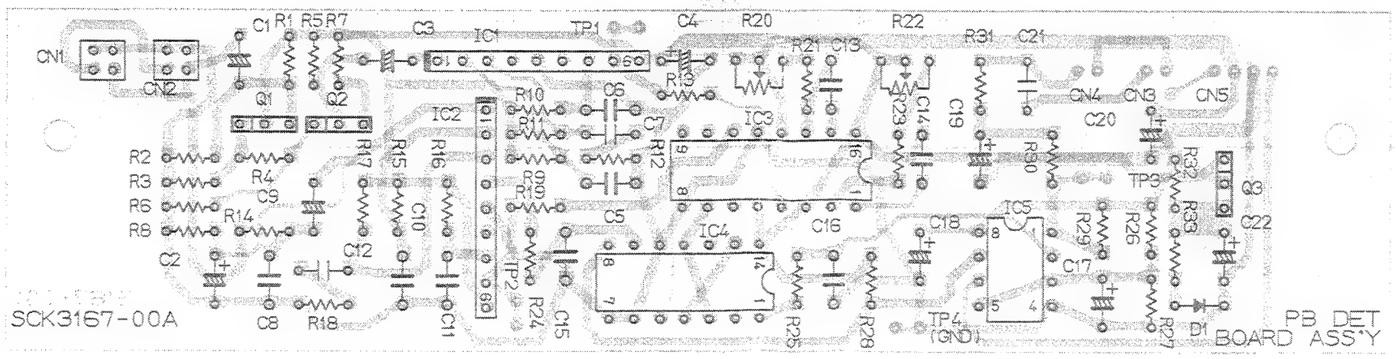
6-13

6.13 PS BOARD SCHEMATIC DIAGRAM



6.14 PB DET BOARD CHART AND DIAGRAM

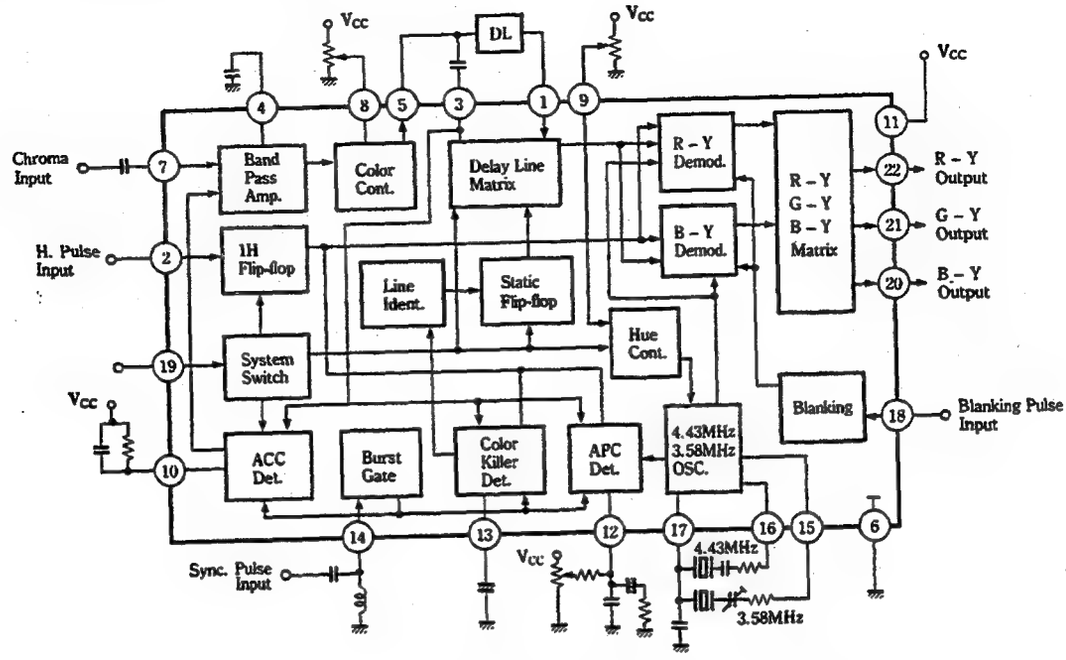




6-15

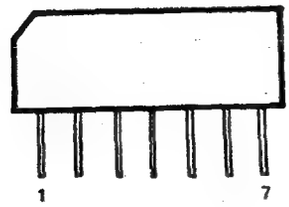
6.15 SCHEMATIC DIAGRAM OF PRINCIPAL ICs

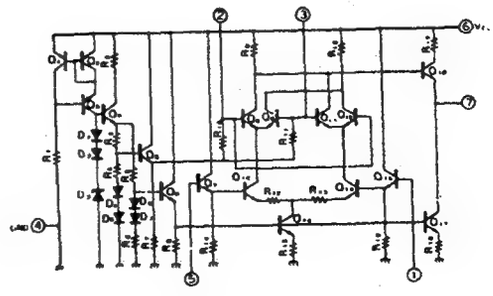
AN5625 [MATSUSHITA]
(TV Chrominance Signal Processing Circuit)



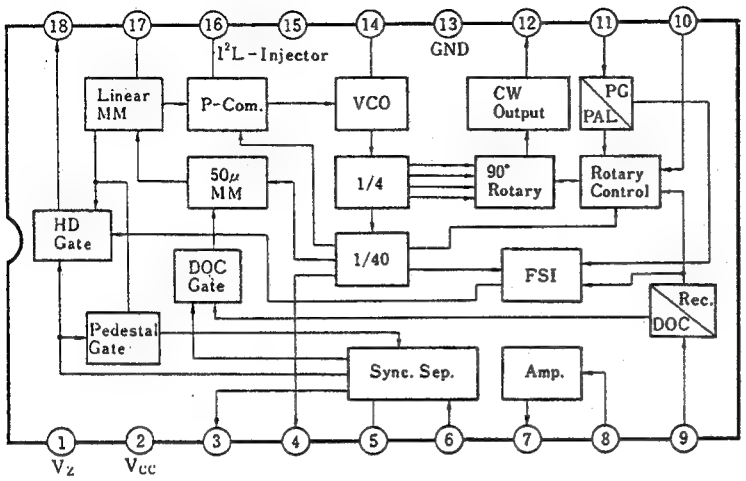
Pin No.	Pin Name	Pin No.	Pin Name
1	Chroma Sig. Input	12	APC Filter
2	H. Pluse Input	13	Color Killer Filter
3	Chroma Sig. Input	14	Burst Gate Pulse Input
4	Chroma By-pass	15	3.58MHz OSC
5	Chroma Sig. Input	16	4.43MHz OSC
6	GND	17	OSC Input
7	Chroma Sig. Input	18	BLK Pulse Input
8	Color Control	19	System SW.
9	Tint Control	20	B-Y Output
10	ACC Filter	21	G-Y Output
11	Vcc	22	R-Y Output

AN614 [MATSUSHITA]
(Balance Modulator)



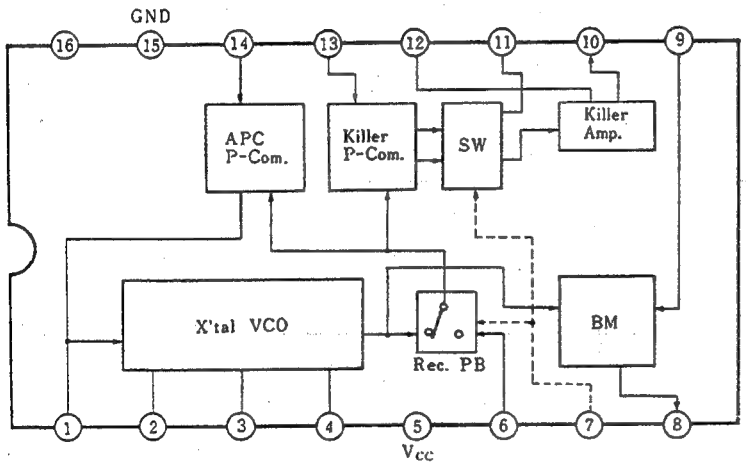


AN6362 [MATSUSHITA]
(VTR Color AFC Circuit)



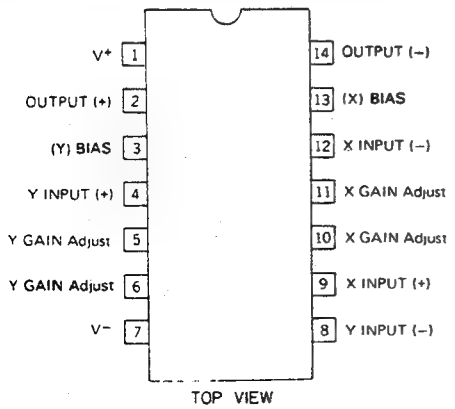
Pin No.	Pin Name
1	Zener Voltage
2	Vcc
3	Vss Output for V Sync.
4	Sync. Front Pulse Output
5	Low Pass Filter
6	Sync. Sep. Input
7	White Clip Output
8	Video Input
9	Rec./DOC Select
10	ID Input
11	PG Input (Head SW)
12	CW Output (630kHz)
13	GND
14	VCO Control
15	I²L Injector
16	P-Com. Filter
17	Linear Mono. Multi.
18	HD Output for Burst Gate

AN6371 [MATSUSHITA]
(VTR Color APC Circuit)

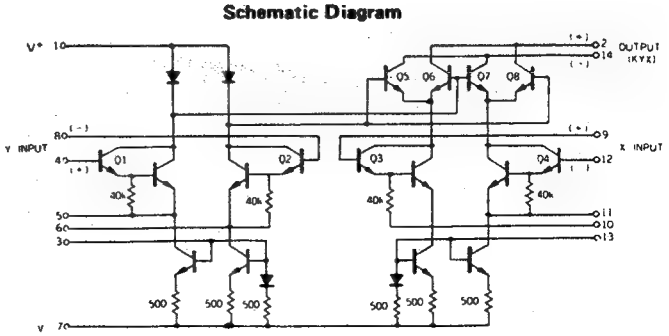


Pin No.	Pin Name
1	APC Filter
2	X'tal Oscillator
3	
4	
5	Vcc
6	4.43MHz Input
7	Rec./P.B. Select
8	5.06MHz Output
9	627kHz Input
10	Killer Output
11	ID Detect
12	Killer Detect
13	Killer Burst Input
14	APC Burst Input
15	GND
16	Killer Filter

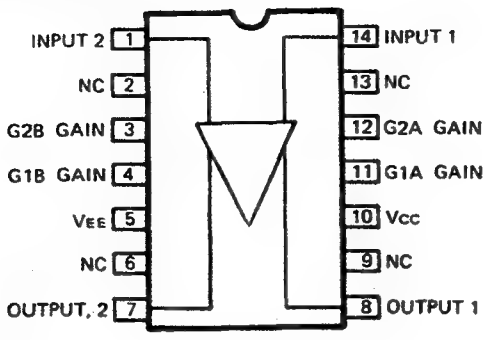
MC1495L (Four Quadrant Multiplier) [MOTOROLA]



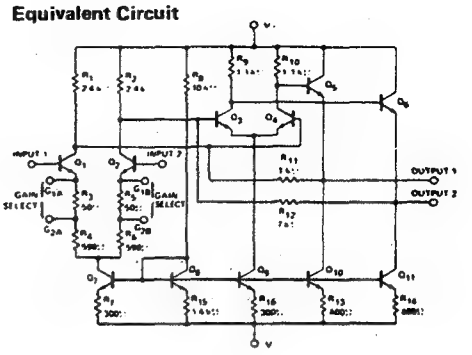
Schematic Diagram



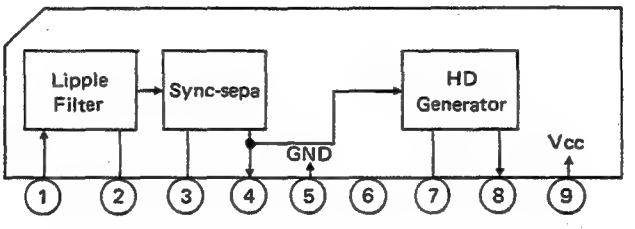
MC1733CP [MOTOROLA]
(Differential Video Wideband Amplifier)



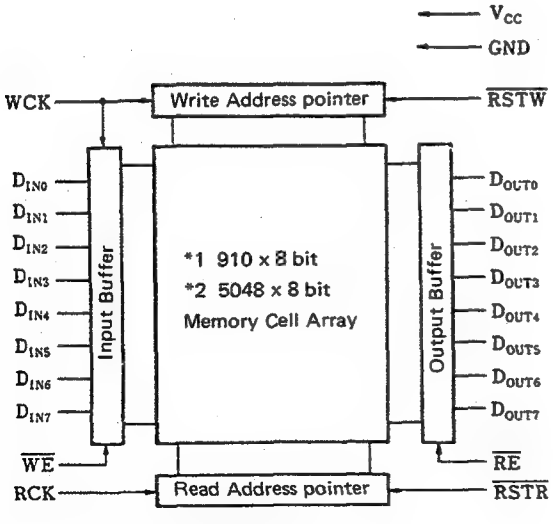
Equivalent Circuit

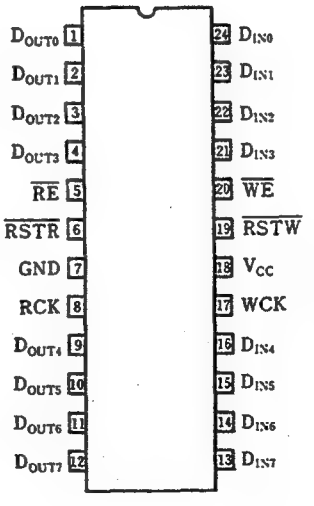


TA7357AP [TOSHIBA] (Sync-pulse Separater)



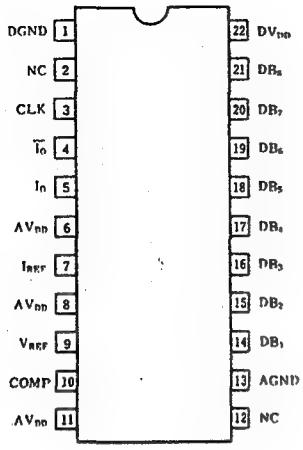
UPD41101C [NEC] (910 x 8 bit FIFO DRAM) *1
UPD42505C [NEC] (5048 x 8 bit FIFO DRAM) *2

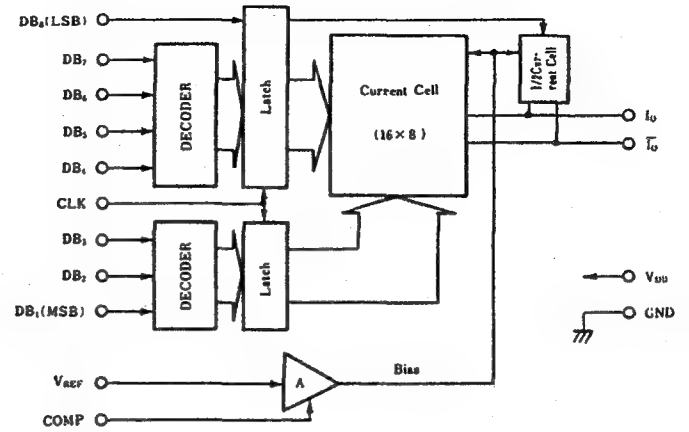




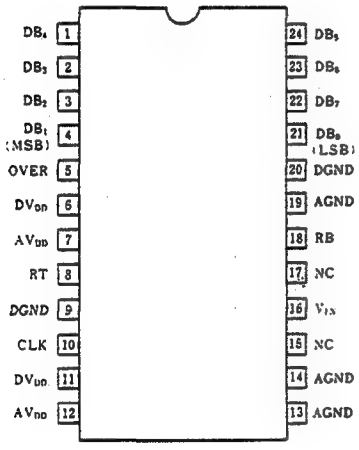
$D_{IN0\sim7}$	:	Data Input
$D_{OUT0\sim7}$	:	Data Output
WCK	:	Write Clock Input
RCK	:	Read Clock Input
$\overline{WE}$	:	Write Enable Input
$\overline{RE}$	:	Read Enable Input
$\overline{RSTW}$	:	Reset Write Input
$\overline{RSTR}$	:	Reset Read Input
V_{CC}	:	+5 V DC
GND	:	Ground

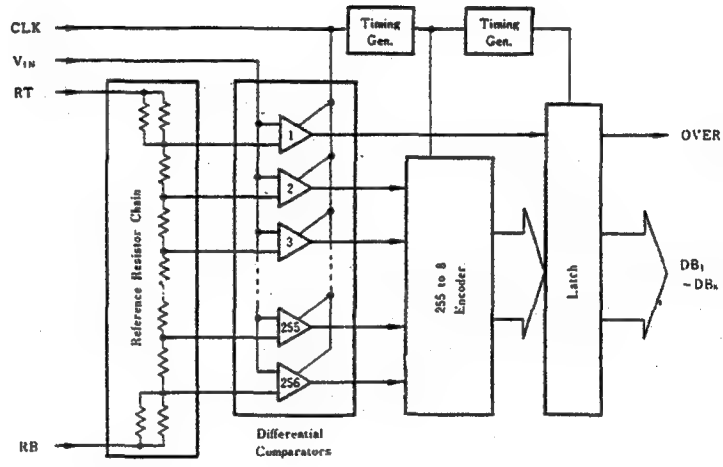
UPD6900C [NEC] (8 bit D/A Converter)





UPD6950C [NEC] (8 Bit A/D Converter)





SECTION 7
ELECTRICAL PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers. For maximum reliability and performance, all other replacement parts should be identical to those specified.

ABBREVIATIONS IN THIS LIST ARE AS FOLLOWS:

RESISTORS – All resistance values are in ohms (Ω).

K	:	1 000
M	:	1 000 000
CR	:	Carbon Resistor
VR	:	Variable Resistor (Potentiometer)
MFR	:	Metal Film Resistor
Chip R	:	Chip Resistor

CAPACITORS – All capacitance values are in μF, unless otherwise indicated.

P	:	μμF
C Cap	:	Ceramic Capacitor
E Cap	:	Electrolytic Capacitor
FM Cap	:	Film Mica Capacitor
MY Cap	:	Mylar Capacitor
NP Cap	:	Non-polar Capacitor
T Cap	:	Tantalum Capacitor
TR Cap	:	Trimmer Capacitor
MP Cap	:	Metalized Paper Capacitor

7.1 RL board assembly [0][1] [0][1][ ][ ][ ][ ][ ][ ]

Symbol No.	Part No.	Part Name	Description	
Q1	2SA564(R)	Transistor	MATSUSHITA	
Q2	2SC1384(R)	Transistor	MATSUSHITA	
D1	MA165	Diode	MATSUSHITA	
D2	MA165	Diode	MATSUSHITA	
D3	MA165	Diode	MATSUSHITA	
D4	MA165	Diode	MATSUSHITA	
D5	MA165	Diode	MATSUSHITA	
D6	MA165	Diode	MATSUSHITA	
R1	QRV141F-75R0AY	MFR	75	1/4 W
R2	QRV141F-75R0AY	MFR	75	1/4 W
R3	QRV141F-75R0AY	MFR	75	1/4 W
R4	QRV141F-75R0AY	MFR	75	1/4 W
R5	QRV141F-75R0AY	MFR	75	1/4 W
R6	QRV141F-75R0AY	MFR	75	1/4 W
R7	QRD161J-472	CR	4.7 K	1/6 W
R8	QRD161J-103	CR	10 K	1/6 W
R9	QRD161J-103	CR	10 K	1/6 W
R10	QRD161J-102	CR	1 K	1/6 W
C1	QER41CM-476	E Cap	47	16 V
C2	QER41CM-476	E Cap	47	16 V
C3	QCS11HJ-181	C Cap	180 P	50 V
C4	QCS11HJ-331	C Cap	330 P	50 V
C5	QCS11HJ-181	C Cap	180 P	50 V
C6	QCS11HJ-181	C Cap	180 P	50 V
C7	QCS11HJ-331	C Cap	330 P	50 V
C8	QCS11HJ-181	C Cap	180 P	50 V
C9	QCS11HJ-181	C Cap	180 P	50 V
C10	QCS11HJ-331	C Cap	330 P	50 V
C11	QCS11HJ-181	C Cap	180 P	50 V
L1	SCV0331-1R5	Peaking Coil	1.5 μH	
L2	SCV0331-1R5	Peaking Coil	1.5 μH	
L3	SCV0331-1R5	Peaking Coil	1.5 μH	
L4	SCV0331-1R5	Peaking Coil	1.5 μH	
L5	SCV0331-1R5	Peaking Coil	1.5 μH	
L6	SCV0331-1R5	Peaking Coil	1.5 μH	
LC1	EXC-EMT271BT	EMI Filter		
LC2	EXC-EMT271BT	EMI Filter		
RY1	SCV1195-005	Relay		
RY2	SCV1195-005	Relay		
RY3	SCV1195-005	Relay		
RY4	SCV1195-005	Relay		
RY5	SCV1195-005	Relay		
RY6	SCV1195-005	Relay		

Symbol No.	Part No.	Part Name	Description
⚠ CN20	—	—	
CN21	SCV1227-002	Connector	2-pin to REG board
CN22	SS31002-026	Connector	26-pin to MT board
CN23	SCV1227-006	Connector	6-pin to CN board
CN24	SCV1073-004	Connector	4-pin to Y/C IN
CN25	SCV1073-004	Connector	4-pin to Y/C OUT
⚠ CN46	SCV1227-002	Connector	2-pin to REG board

7.2 CN board assembly [0][2] [0][2][ ][ ][ ][ ][ ][ ]

Symbol No.	Part No.	Part Name	Description	
IC1	TC4050BP	IC	TOSHIBA	
IC2	SN74LS07N	IC	TEXAS	
IC3	–	–		
IC4	UPD74HC367C	IC	NEC	
IC5	NJM2903D	IC	JRC	
IC6	TA78L009AP	IC	TOSHIBA	
LC1	EXC-EMT102BT	LC Filter		
LC2	EXC-EMT102BT	LC Filter		
LC3	EXC-EMT102BT	LC Filter		
LC4	EXC-EMT102BT	LC Filter		
LC5	EXC-EMT102BT	LC Filter		
LC6	EXC-EMT102BT	LC Filter		
LC7	EXC-EMT102BT	LC Filter		
LC8	EXC-EMT102BT	LC Filter		
LC9	EXC-EMT102BT	LC Filter		
LC10	EXC-EMT102BT	LC Filter		
LC11	EXC-EMT102BT	LC Filter		
LC12	–	–		
LC13	EXC-EMT102BT	LC Filter		
LC14	EXC-EMT102BT	LC Filter		
LC15	EXC-EMT102BT	LC Filter		
R1	QRD161J-103	CR	10 K	1/6 W
R2	QRD161J-473	CR	47 K	1/6 W
R3	QRD161J-473	CR	47 K	1/6 W
R4	QRD161J-472	CR	4.7 K	1/6 W
R5	QRD161J-472	CR	4.7 K	1/6 W
R6	QRD161J-473	CR	47 K	1/6 W
R7	QRD161J-122	CR	1.2 K	1/6 W
R8	QRD161J-122	CR	1.2 K	1/6 W
R9	QRD161J-122	CR	1.2 K	1/6 W
R10	QRD161J-473	CR	47 K	1/6 W
R11	QRD161J-122	CR	1.2 K	1/6 W
R12	QRD161J-103	CR	10 K	1/6 W
R13	QRD161J-103	CR	10 K	1/6 W
R14	QRD161J-103	CR	10 K	1/6 W
R15	QRD161J-122	CR	1.2 K	1/6 W
R16	QRD161J-104	CR	100 K	1/6 W
R17	QRD161J-103	CR	10 K	1/6 W
R18	QRD161J-103	CR	10 K	1/6 W
R19	QRD161J-473	CR	47 K	1/6 W
C1	QCZ0206-104	C Cap	0.1	
C2	QER41CM-476	E Cap	47	16 V
C3	QER41CM-476	E Cap	47	16 V
C4	QCZ0206-104	C Cap	0.1	
C5	QER41CM-476	E Cap	47	16 V
C6	QCZ0206-104	C Cap	0.1	
C7	QCS11HJ-181	C Cap	180 P	50 V
C8	QCS11HJ-331	C Cap	330 P	50 V
C9	QCS11HJ-181	C Cap	180 P	50 V

Symbol No.	Part No.	Part Name	Description
L1	BL02RN2-R62	EMI Filter	
L2	BL02RN2-R62	EMI Filter	
L3	SCV0331-1R5	Coil	1.5 μH
L4	SCV0331-1R5	Coil	1.5 μH
CN16	Refer to Section 5 - ㊴.	Connector	15-pin REMOTE
CN26	SS31002-034	Connector	34-pin to MT board

7.3 REG board assembly [0][3]

[0][3]□□□□□□

Symbol No.	Part No.	Part Name	Description
IC1	TA78009AP	IC	TOSHIBA
IC2	NJM79M09A	IC	JRC
(IC2)	SCV1289-001	Heat Sink	with Screw DPSP3008Z
Q1	DTC124ES	Transistor	ROHM
R1	QRD161J-221	CR	220 1/6 W
R2	QRD161J-471	CR	470 1/6 W
R3	QRD161J-222	CR	2.2 K 1/6 W
R4	QRD161J-222	CR	2.2 K 1/6 W
C1	QER41CM-476	E Cap	47 16 V
C2	QER41CM-476	E Cap	47 16 V
C2	QER41CM-476	E Cap	47 16 V
C4	QER41CM-476	E Cap	47 16 V
C5	QER41CM-476	E Cap	47 16 V
C6	QER41CM-476	E Cap	47 16 V
C7	QER41CM-476	E Cap	47 16 V
C8	QER41CM-476	E Cap	47 16 V
C9	QER41CM-476	E Cap	47 16 V
C10	QER41CM-476	E Cap	47 16 V
C11	QER41CM-476	E Cap	47 16 V
C12	QER41CM-476	E Cap	47 16 V
C13	QER41CM-476	E Cap	47 16 V
C14	QER41CM-476	E Cap	47 16 V
C15	QER41CM-476	E Cap	47 16 V
C16	QER41CM-476	E Cap	47 16 V
C17	QER41CM-476	E Cap	47 16 V
C18	QER41CM-476	E Cap	47 16 V
C19	QER41CM-476	E Cap	47 16 V
CN31	SCV0501-001	Connector	30-pin
CN32	SCV1227-002	Connector	2-pin
CN33	SCV0344-001	Connector	40-pin
CN37	SCV1227-002	Connector	2-pin
CN38	SM3490-006	Connector	6-pin
CN43	SCV1227-002	Connector	2-pin
CN44	SCV1227-003	Connector	3-pin

7.4 MT board assembly [0][4]

[0][4]□□□□□□

Symbol No.	Part No.	Part Name	Description
CN22	SC31012-2612	Flat Cable	26-pin
CN26	SC31012-3412	Flat Cable	34-pin
CN27	SCV1196-090	Connector	90-pin
CN28	SCV1196-090	Connector	90-pin
CN29	SCV1227-002	Connector	2-pin
CN30	SCV1227-002	Connector	2-pin
CN31	SCV0500-001	Connector	30-pin
CN49	SCV1228-004	Connector	4-pin

7.5 SUB board assembly [0][5]

[0][5]□□□□□□

Symbol No.	Part No.	Part Name	Description
VR1	QVPB702-202	VR	2 K SC FINE
VR2	QVPB702-103	VR	10 K H. PHASE
SW2	SCV1399-001	Toggle Switch	Y/C OUTPUT
SW3	SCV1399-001	Toggle Switch	SC COARSE

7.6 VIDEO board assembly 06 06□□□□□□

Symbol No.	Part No.	Part Name	Description
IC1	TC4052BP	IC	TOSHIBA
IC2	TC4052BP	IC	TOSHIBA
IC3	TC4053BP	IC	TOSHIBA
IC4	AN5625N	IC	MATSUSHITA
IC5	NJM311D	IC	JRC
IC6	NJM319D	IC	JRC
IC7	TC4538BP	IC	TOSHIBA
IC8	TC4538BP	IC	TOSHIBA
IC9	SN74LS07N	IC	TEXAS
IC10	NJM4560DD	IC	JRC
IC11	MC1495L	IC	MOTOROLA
IC12	MC1495L	IC	MOTOROLA
IC13	MC1495L	IC	MOTOROLA
IC14	MC1733CP	IC	MOTOROLA
IC15	NJM311D	IC	JRC
IC16	TC4053BP	IC	TOSHIBA
IC17	TC4053BP	IC	TOSHIBA
IC18	UPD74HC04C	IC	NEC
IC19	AN614	IC	MATSUSHITA
IC20	AN614	IC	MATSUSHITA
IC21	AN614	IC	MATSUSHITA
IC22	UPD74HC04C	IC	NEC
IC23	TC4053BP	IC	TOSHIBA
IC24	SN74LS123N	IC	TEXAS
IC25	TC4053BP	IC	TOSHIBA
IC26	TC4013BAP	IC	TOSHIBA
IC27	AN6362	IC	MATSUSHITA
IC28	AN6371	IC	MATSUSHITA
Q1	2SC1685(R.S)	Transistor	MATSUSHITA
Q2	2SC1685(R.S)	Transistor	MATSUSHITA
Q3	2SC829(C)	Transistor	MATSUSHITA
Q4	2SC829(C)	Transistor	MATSUSHITA
Q5	2SC829(C)	Transistor	MATSUSHITA
Q6	2SC829(C)	Transistor	MATSUSHITA
Q7	2SC829(C)	Transistor	MATSUSHITA
Q8	2SC1685(R.S)	Transistor	MATSUSHITA
Q9	2SC1685(R.S)	Transistor	MATSUSHITA
Q10	2SC1685(R.S)	Transistor	MATSUSHITA
Q11	2SC1685(R.S)	Transistor	MATSUSHITA
Q12	2SC1685(R.S)	Transistor	MATSUSHITA
Q13	2SC829(C)	Transistor	MATSUSHITA
Q14	2SC1685(R.S)	Transistor	MATSUSHITA
Q15	2SA838(C)	Transistor	MATSUSHITA
Q16	2SC829(C)	Transistor	MATSUSHITA
Q17	2SC1685(R.S)	Transistor	MATSUSHITA
Q18	2SC1685(R.S)	Transistor	MATSUSHITA
Q19	2SC1685(R.S)	Transistor	MATSUSHITA
Q20	2SC1685(R.S)	Transistor	MATSUSHITA
Q21	2SA838(C)	Transistor	MATSUSHITA
Q22	2SC829(C)	Transistor	MATSUSHITA
Q23	2SC1685(R.S)	Transistor	MATSUSHITA
Q24	2SC1685(R.S)	Transistor	MATSUSHITA
Q25	2SC1685(R.S)	Transistor	MATSUSHITA
Q26	2SC1685(R.S)	Transistor	MATSUSHITA
Q27	2SC1685(R.S)	Transistor	MATSUSHITA
Q28	2SC1685(R.S)	Transistor	MATSUSHITA

Symbol No.	Part No.	Part Name	Description
Q29	2SA838(C)	Transistor	MATSUSHITA
Q30	2SC829(C)	Transistor	MATSUSHITA
Q31	2SC1685(R.S)	Transistor	MATSUSHITA
Q32	2SA564(R)	Transistor	MATSUSHITA
Q33	2SC1685(R.S)	Transistor	MATSUSHITA
Q34	2SA838(C)	Transistor	MATSUSHITA
Q35	2SC829(C)	Transistor	MATSUSHITA
Q36	2SC1685(R.S)	Transistor	MATSUSHITA
Q37	2SA564(R)	Transistor	MATSUSHITA
Q38	2SC1685(R.S)	Transistor	MATSUSHITA
Q39	2SA838(C)	Transistor	MATSUSHITA
Q40	2SC829(C)	Transistor	MATSUSHITA
Q41	2SC1685(R.S)	Transistor	MATSUSHITA
Q42	2SA564(R)	Transistor	MATSUSHITA
Q43	2SC1685(R.S)	Transistor	MATSUSHITA
Q44	2SC1685(R.S)	Transistor	MATSUSHITA
Q45	2SC1685(R.S)	Transistor	MATSUSHITA
Q46	2SC1685(R.S)	Transistor	MATSUSHITA
Q47	2SC1685(R.S)	Transistor	MATSUSHITA
Q48	2SA564(R)	Transistor	MATSUSHITA
Q49	2SC1685(R.S)	Transistor	MATSUSHITA
Q50	2SA564(R)	Transistor	MATSUSHITA
Q51	2SC1685(R.S)	Transistor	MATSUSHITA
Q52	2SC1685(R.S)	Transistor	MATSUSHITA
Q53	2SA564(R)	Transistor	MATSUSHITA
Q54	2SC829(C)	Transistor	MATSUSHITA
Q55	2SA838(C)	Transistor	MATSUSHITA
Q56	2SC829(C)	Transistor	MATSUSHITA
Q57	2SC1685(R.S)	Transistor	MATSUSHITA
Q58	2SA564(R)	Transistor	MATSUSHITA
Q59	2SC1685(R.S)	Transistor	MATSUSHITA
Q60	2SC1685(R.S)	Transistor	MATSUSHITA
Q61	2SK163(M.N)	FET	NEC
Q62	2SA838(C)	Transistor	MATSUSHITA
Q63	2SC1685(R.S)	Transistor	MATSUSHITA
Q64	2SC1685(R.S)	Transistor	MATSUSHITA
Q65	2SC1685(R.S)	Transistor	MATSUSHITA
Q66	2SK163(M.N)	FET	NEC
Q67	2SC829(C)	Transistor	MATSUSHITA
Q68	2SA838(C)	Transistor	MATSUSHITA
Q69	2SC829(C)	Transistor	MATSUSHITA
Q70	2SC1685(R.S)	Transistor	MATSUSHITA
Q71	2SC1685(R.S)	Transistor	MATSUSHITA
Q72	2SC1685(R.S)	Transistor	MATSUSHITA
Q73	2SC1685(R.S)	Transistor	MATSUSHITA
Q74	2SC1685(R.S)	Transistor	MATSUSHITA
Q75	2SK163(M.N)	FET	NEC
Q76	2SC829(C)	Transistor	MATSUSHITA
Q77	2SC1685(R.S)	Transistor	MATSUSHITA
Q78	2SK163(M.N)	FET	NEC
Q79	2SC829(C)	Transistor	MATSUSHITA
Q80	2SA838(C)	Transistor	MATSUSHITA
Q81	2SC829(C)	Transistor	MATSUSHITA
Q82	2SC1685(R.S)	Transistor	MATSUSHITA
Q83	2SA564(R)	Transistor	MATSUSHITA
Q84	2SC1685(R.S)	Transistor	MATSUSHITA
Q85	2SA564(R)	Transistor	MATSUSHITA
Q86	2SA838(C)	Transistor	MATSUSHITA
Q87	2SC1685(R.S)	Transistor	MATSUSHITA

Symbol No.	Part No.	Part Name	Description
Q88	2SC1685(R,S)	Transistor	MATSUSHITA
Q89	2SC1685(R,S)	Transistor	MATSUSHITA
Q90	2SC829(C)	Transistor	MATSUSHITA
Q91	2SC1685(R,S)	Transistor	MATSUSHITA
Q92	2SK163(M,N)	FET	NEC
Q93	2SC1685(R,S)	Transistor	MATSUSHITA
Q94	2SC1685(R,S)	Transistor	MATSUSHITA
Q95	2SC829(C)	Transistor	MATSUSHITA
Q96	2SC1685(R,S)	Transistor	MATSUSHITA
Q97	2SC1685(R,S)	Transistor	MATSUSHITA
Q98	2SC1685(R,S)	Transistor	MATSUSHITA
Q99	2SA564(R)	Transistor	MATSUSHITA
Q100	2SC1685(R,S)	Transistor	MATSUSHITA
Q101	2SC1685(R,S)	Transistor	MATSUSHITA
Q102	2SA564(R)	Transistor	MATSUSHITA
Q103	DTA124ES	Transistor	ROHM
D1	MA165	Diode	MATSUSHITA
D2	MA165	Diode	MATSUSHITA
D3	MA165	Diode	MATSUSHITA
D4	MA165	Diode	MATSUSHITA
D5	MA165	Diode	MATSUSHITA
D6	MA165	Diode	MATSUSHITA
D7	MA165	Diode	MATSUSHITA
D8	MA165	Diode	MATSUSHITA
D9	MA165	Diode	MATSUSHITA
D10	MA165	Diode	MATSUSHITA
D11	MA165	Diode	MATSUSHITA
D12	MA165	Diode	MATSUSHITA
D13	MA165	Diode	MATSUSHITA
D14	HZ15-3L	Zener Diode	HITACHI
R1	QRD161J-223	CR	22 K 1/6 W
R2	QRD161J-273	CR	27 K 1/6 W
R3	QRD161J-823	CR	82 K 1/6 W
R4	QRD161J-102	CR	1 K 1/6 W
R5	QRD161J-272	CR	2.7 K 1/6 W
R6	QRD161J-102	CR	1 K 1/6 W
R7	QRD161J-102	CR	1 K 1/6 W
R8	QRD161J-272	CR	2.7 K 1/6 W
R9	QRD161J-471	CR	470 1/6 W
R10	QRD161J-102	CR	1 K 1/6 W
R11	QRD161J-102	CR	1 K 1/6 W
R12	QRD161J-394	CR	390 K 1/6 W
R13	QRD161J-473	CR	47 K 1/6 W
R14	QRD161J-472	CR	4.7 K 1/6 W
R15	QRD161J-822	CR	8.2 K 1/6 W
R16	QRD161J-271	CR	270 1/6 W
R17	QRD161J-102	CR	1 K 1/6 W
R18	QRD161J-222	CR	2.2 K 1/6 W
R19	QRD161J-223	CR	22 K 1/6 W
R20	QRD161J-273	CR	27 K 1/6 W

Symbol No.	Part No.	Part Name	Description
R21	QRD161J-223	CR	22 K 1/6 W
R22	QRD161J-273	CR	27 K 1/6 W
R23	QRD161J-222	CR	2.2 K 1/6 W
R24	QRD161J-223	CR	22 K 1/6 W
R25	QRD161J-273	CR	27 K 1/6 W
R26	QRD161J-222	CR	2.2 K 1/6 W
R27	QRD161J-153	CR	15 K 1/6 W
R28	QRD161J-153	CR	15 K 1/6 W
R29	QRD161J-102	CR	1 K 1/6 W
R30	QRD161J-681	CR	680 1/6 W
R31	QRD161J-222	CR	2.2 K 1/6 W
R32	QRD161J-102	CR	1 K 1/6 W
R33	QRD161J-102	CR	1 K 1/6 W
R34	QRD161J-392	CR	3.9 K 1/6 W
R35	QRD161J-391	CR	390 1/6 W
R36	QRD161J-391	CR	390 1/6 W
R37	QRD161J-332	CR	3.3 K 1/6 W
R38	QRD161J-472	CR	4.7 K 1/6 W
R39	QRD161J-102	CR	1 K 1/6 W
R40	QRD161J-392	CR	3.9 K 1/6 W
R41	QRD161J-103	CR	10 K 1/6 W
R42	QRD161J-152	CR	1.5 K 1/6 W
R43	QRD161J-153	CR	15 K 1/6 W
R44	QRD161J-224	CR	220 K 1/6 W
R45	QRD161J-225	CR	2.2 M 1/6 W
R46	QRD161J-471	CR	470 1/6 W
R47	QRD161J-562	CR	5.6 K 1/6 W
R48	QRD161J-153	CR	15 K 1/6 W
R49	QRD161J-272	CR	2.7 K 1/6 W
R50	QRD161J-153	CR	15 K 1/6 W
R51	QRD161J-682	CR	6.8 K 1/6 W
R52	QRD161J-332	CR	3.3 K 1/6 W
R53	QRD161J-104	CR	100 K 1/6 W
R54	QRD161J-272	CR	2.7 K 1/6 W
R55	QRD161J-822	CR	8.2 K 1/6 W
R56	QRD161J-472	CR	4.7 K 1/6 W
R57	QRD161J-821	CR	820 1/6 W
R58	QRD161J-821	CR	820 1/6 W
R59	QRD161J-332	CR	3.3 K 1/6 W
R60	QRD161J-102	CR	1 K 1/6 W
R61	QRD161J-102	CR	1 K 1/6 W
R62	QRD161J-392	CR	3.9 K 1/6 W
R63	QRD161J-471	CR	470 1/6 W
R64	QRD161J-102	CR	1 K 1/6 W
R65	QRD161J-153	CR	15 K 1/6 W
R66	QRD161J-153	CR	15 K 1/6 W
R67	QRD161J-102	CR	1 K 1/6 W
R68	QRD161J-823	CR	82 K 1/6 W
R69	QRD161J-472	CR	4.7 K 1/6 W
R70	QRD161J-821	CR	820 1/6 W
R71	QRD161J-821	CR	820 1/6 W
R72	QRD161J-332	CR	3.3 K 1/6 W
R73	QRD161J-102	CR	1 K 1/6 W
R74	QRD161J-102	CR	1 K 1/6 W
R75	QRD161J-392	CR	3.9 K 1/6 W
R76	QRD161J-471	CR	470 1/6 W
R77	QRD161J-102	CR	1 K 1/6 W
R78	QRD161J-153	CR	15 K 1/6 W
R79	QRD161J-153	CR	15 K 1/6 W
R80	QRD161J-102	CR	1 K 1/6 W

Symbol No.	Part No.	Part Name	Description	
R81	QRD161J-823	CR	82 K	1/6 W
R82	QRD161J-223	CR	22 K	1/6 W
R83	QRD161J-273	CR	27 K	1/6 W
R84	QRD161J-823	CR	82 K	1/6 W
R85	QRD161J-223	CR	22 K	1/6 W
R86	QRD161J-273	CR	27 K	1/6 W
R87	QRD161J-823	CR	82 K	1/6 W
R88	QRD161J-101	CR	100	1/6 W
R89	QRD161J-103	CR	10 K	1/6 W
R90	QRD161J-103	CR	10 K	1/6 W
R91	QRD161J-103	CR	10 K	1/6 W
R92	QRD161J-103	CR	10 K	1/6 W
R93	QRD161J-102	CR	1 K	1/6 W
R94	QRD161J-101	CR	100	1/6 W
R95	QRD161J-102	CR	1 K	1/6 W
R96	QRD161J-102	CR	1 K	1/6 W
R97	QRD161J-102	CR	1 K	1/6 W
R98	QRD161J-272	CR	2.7 K	1/6 W
R99	QRD161J-272	CR	2.7 K	1/6 W
R100	QRD161J-272	CR	2.7 K	1/6 W
R101	QRD161J-471	CR	470	1/6 W
R102	QRD161J-471	CR	470	1/6 W
R103	QRD161J-821	CR	820	1/6 W
R104	QRD161J-152	CR	1.5 K	1/6 W
R105	QRD161J-103	CR	10 K	1/6 W
R106	QRD161J-183	CR	18 K	1/6 W
R107	QRD161J-681	CR	680	1/6 W
R108	QRD161J-561	CR	560	1/6 W
R109	QRD161J-183	CR	18 K	1/6 W
R110	QRD161J-103	CR	10 K	1/6 W
R111	QRD161J-471	CR	470	1/6 W
R112	QRD161J-471	CR	470	1/6 W
R113	QRD161J-102	CR	1 K	1/6 W
R114	QRD161J-101	CR	100	1/6 W
R115	QRD161J-103	CR	10 K	1/6 W
R116	QRD161J-103	CR	10 K	1/6 W
R117	QRD161J-103	CR	10 K	1/6 W
R118	QRD161J-103	CR	10 K	1/6 W
R119	QRD161J-102	CR	1 K	1/6 W
R120	QRD161J-221	CR	220	1/6 W
R121	QRD161J-102	CR	1 K	1/6 W
R122	QRD161J-102	CR	1 K	1/6 W
R123	QRD161J-102	CR	1 K	1/6 W
R124	QRD161J-272	CR	2.7 K	1/6 W
R125	QRD161J-272	CR	2.7 K	1/6 W
R126	QRD161J-272	CR	2.7 K	1/6 W
R127	QRD161J-471	CR	470	1/6 W
R128	QRD161J-471	CR	470	1/6 W
R129	QRD161J-821	CR	820	1/6 W
R130	QRD161J-152	CR	1.5 K	1/6 W
R131	QRD161J-103	CR	10 K	1/6 W
R132	QRD161J-183	CR	18 K	1/6 W
R133	QRD161J-681	CR	680	1/6 W
R134	QRD161J-561	CR	560	1/6 W
R135	QRD161J-183	CR	18 K	1/6 W
R136	QRD161J-103	CR	10 K	1/6 W
R137	QRD161J-471	CR	470	1/6 W
R138	QRD161J-471	CR	470	1/6 W
R139	QRD161J-102	CR	1 K	1/6 W
R140	QRD161J-101	CR	100	1/6 W

Symbol No.	Part No.	Part Name	Description	
R141	QRD161J-103	CR	10 K	1/6 W
R142	QRD161J-103	CR	10 K	1/6 W
R143	QRD161J-103	CR	10 K	1/6 W
R144	QRD161J-103	CR	10 K	1/6 W
R145	QRD161J-102	CR	1 K	1/6 W
R146	QRD161J-221	CR	220	1/6 W
R147	QRD161J-102	CR	1 K	1/6 W
R148	QRD161J-102	CR	1 K	1/6 W
R149	QRD161J-102	CR	1 K	1/6 W
R150	QRD161J-272	CR	2.7 K	1/6 W
R151	QRD161J-272	CR	2.7 K	1/6 W
R152	QRD161J-272	CR	2.7 K	1/6 W
R153	QRD161J-471	CR	470	1/6 W
R154	QRD161J-471	CR	470	1/6 W
R155	QRD161J-821	CR	820	1/6 W
R156	QRD161J-152	CR	1.5 K	1/6 W
R157	QRD161J-103	CR	10 K	1/6 W
R158	QRD161J-183	CR	18 K	1/6 W
R159	QRD161J-681	CR	680	1/6 W
R160	QRD161J-561	CR	560	1/6 W
R161	QRD161J-183	CR	18 K	1/6 W
R162	QRD161J-103	CR	10 K	1/6 W
R163	QRD161J-471	CR	470	1/6 W
R164	QRD161J-471	CR	470	1/6 W
R165	QRD161J-102	CR	1 K	1/6 W
R166	QRD161J-104	CR	100 K	1/6 W
R167	QRD161J-222	CR	2.2 K	1/6 W
R168	QRD161J-563	CR	56 K	1/6 W
R169	QRD161J-123	CR	12 K	1/6 W
R170	QRD161J-332	CR	3.3 K	1/6 W
R171	QRD161J-152	CR	1.5 K	1/6 W
R172	QRD161J-332	CR	3.3 K	1/6 W
R173	QRD161J-472	CR	4.7 K	1/6 W
R174	QRD161J-392	CR	3.9 K	1/6 W
R175	QRD161J-104	CR	100 K	1/6 W
R176	QRD161J-223	CR	22 K	1/6 W
R177	QRD161J-223	CR	22 K	1/6 W
R178	QRD161J-473	CR	47 K	1/6 W
R179	QRD161J-101	CR	100	1/6 W
R180	QRD161J-222	CR	2.2 K	1/6 W
R181	QRD161J-223	CR	22 K	1/6 W
R182	QRD161J-223	CR	22 K	1/6 W
R183	QRD161J-224	CR	220 K	1/6 W
R184	QRD161J-472	CR	4.7 K	1/6 W
R185	QRD161J-103	CR	10 K	1/6 W
R186	QRD161J-472	CR	4.7 K	1/6 W
R187	QRD161J-332	CR	3.3 K	1/6 W
R188	QRD161J-224	CR	220 K	1/6 W
R189	QRD161J-222	CR	2.2 K	1/6 W
R190	QRD161J-273	CR	27 K	1/6 W
R191	QRD161J-472	CR	4.7 K	1/6 W
R192	QRD161J-103	CR	10 K	1/6 W
R193	QRD161J-222	CR	2.2 K	1/6 W
R194	QRD161J-103	CR	10 K	1/6 W
R195	QRD161J-682	CR	6.8 K	1/6 W
R196	QRD161J-223	CR	22 K	1/6 W
R197	QRD161J-270	CR	27	1/6 W
R198	QRD161J-470	CR	47	1/6 W
R199	QRD161J-103	CR	10 K	1/6 W
R200	QRD161J-103	CR	10 K	1/6 W

Symbol No.	Part No.	Part Name	Description	
R201	QRD161J-103	CR	10 K	1/6 W
R202	QRD161J-103	CR	10 K	1/6 W
R203	QRD161J-103	CR	10 K	1/6 W
R204	QRD161J-103	CR	10 K	1/6 W
R205	QRD161J-223	CR	22 K	1/6 W
R206	QRD161J-472	CR	4.7 K	1/6 W
R207	QRD161J-472	CR	4.7 K	1/6 W
R208	QRD161J-222	CR	2.2 K	1/6 W
R209	QRD161J-222	CR	2.2 K	1/6 W
R210	QRD161J-562	CR	5.6 K	1/6 W
R211	QRD161J-394	CR	390 K	1/6 W
R212	QRD161J-102	CR	1 K	1/6 W
R213	QRD161J-103	CR	10 K	1/6 W
R214	QRD161J-472	CR	4.7 K	1/6 W
R215	QRD161J-472	CR	4.7 K	1/6 W
R216	QRD161J-472	CR	4.7 K	1/6 W
R217	QRD161J-472	CR	4.7 K	1/6 W
R218	QRD161J-472	CR	4.7 K	1/6 W
R219	QRD161J-105	CR	1 M	1/6 W
R220	QRD161J-563	CR	56 K	1/6 W
R221	QRD161J-563	CR	56 K	1/6 W
R222	QRD161J-562	CR	5.6 K	1/6 W
R223	QRD161J-563	CR	56 K	1/6 W
R224	QRD161J-471	CR	470	1/6 W
R225	QRD161J-683	CR	68 K	1/6 W
R226	QRD161J-563	CR	56 K	1/6 W
R227	QRD161J-563	CR	56 K	1/6 W
R228	QRD161J-562	CR	5.6 K	1/6 W
R229	QRD161J-563	CR	56 K	1/6 W
R230	QRD161J-471	CR	470	1/6 W
R231	QRD161J-683	CR	68 K	1/6 W
R232	QRD161J-103	CR	10 K	1/6 W
R233	QRD161J-103	CR	10 K	1/6 W
R234	QRD161J-472	CR	4.7 K	1/6 W
R235	QRD161J-823	CR	82 K	1/6 W
R236	QRD161J-221	CR	220	1/6 W
R237	QRD161J-103	CR	10 K	1/6 W
R238	QRD161J-273	CR	27 K	1/6 W
R239	QRD161J-332	CR	3.3 K	1/6 W
R240	QRD161J-471	CR	470	1/6 W
R241	QRD161J-471	CR	470	1/6 W
R242	QRD161J-332	CR	3.3 K	1/6 W
R243	QRD161J-822	CR	8.2 K	1/6 W
R244	QRD161J-681	CR	680	1/6 W
R245	QRD161J-561	CR	560	1/6 W
R246	QRD161J-102	CR	1 K	1/6 W
R247	QRD161J-273	CR	27 K	1/6 W
R248	QRD161J-103	CR	10 K	1/6 W
R249	QRD161J-392	CR	3.9 K	1/6 W
R250	QRD161J-472	CR	4.7 K	1/6 W
R251	QRD161J-102	CR	1 K	1/6 W
R252	QRD161J-221	CR	220	1/6 W
R253	QRD161J-562	CR	5.6 K	1/6 W
R254	QRD161J-102	CR	1 K	1/6 W
R255	QRD161J-223	CR	22 K	1/6 W
R256	QRD161J-153	CR	15 K	1/6 W
R257	QRD161J-102	CR	1 K	1/6 W
R258	QRD161J-122	CR	1.2 K	1/6 W
R259	QRD161J-392	CR	3.9 K	1/6 W
R260	QRD161J-105	CR	1 M	1/6 W

Symbol No.	Part No.	Part Name	Description	
R261	QRD161J-223	CR	22 K	1/6 W
R262	QRD161J-270	CR	27	1/6 W
R263	QRD161J-270	CR	27	1/6 W
R264	QRD161J-392	CR	3.9 K	1/6 W
R265	QRD161J-222	CR	2.2 K	1/6 W
R266	QRD161J-222	CR	2.2 K	1/6 W
R267	QRD161J-222	CR	2.2 K	1/6 W
R268	QRD161J-102	CR	1 K	1/6 W
R269	QRD161J-273	CR	27 K	1/6 W
R270	QRD161J-223	CR	22 K	1/6 W
R271	QRD161J-681	CR	680	1/6 W
R272	QRD161J-182	CR	1.8 K	1/6 W
R273	QRD161J-391	CR	390	1/6 W
R274	QRD161J-222	CR	2.2 K	1/6 W
R275	QRD161J-102	CR	1 K	1/6 W
R276	QRD161J-102	CR	1 K	1/6 W
R277	QRD161J-103	CR	10 K	1/6 W
R278	QRD161J-562	CR	5.6 K	1/6 W
R279	QRD161J-103	CR	10 K	1/6 W
R280	QRD161J-562	CR	5.6 K	1/6 W
R281	QRD161J-102	CR	1 K	1/6 W
R282	QRD161J-472	CR	4.7 K	1/6 W
R283	QRD161J-102	CR	1 K	1/6 W
R284	QRD161J-472	CR	4.7 K	1/6 W
R285	QRD161J-221	CR	220	1/6 W
R286	QRD161J-271	CR	270	1/6 W
R287	QRD161J-223	CR	22 K	1/6 W
R288	QRD161J-221	CR	220	1/6 W
R289	QRD161J-391	CR	390	1/6 W
R290	QRD161J-221	CR	220	1/6 W
R291	QRD161J-103	CR	10 K	1/6 W
R292	QRD161J-273	CR	27 K	1/6 W
R293	QRD161J-332	CR	3.3 K	1/6 W
R294	QRD161J-471	CR	470	1/6 W
R295	QRD161J-471	CR	470	1/6 W
R296	QRD161J-332	CR	3.3 K	1/6 W
R297	QRD161J-822	CR	8.2 K	1/6 W
R298	QRD161J-681	CR	680	1/6 W
R299	QRD161J-561	CR	560	1/6 W
R300	QRD161J-102	CR	1 K	1/6 W
R301	QRD161J-223	CR	22 K	1/6 W
R302	QRD161J-153	CR	15 K	1/6 W
R303	QRD161J-102	CR	1 K	1/6 W
R304	QRD161J-102	CR	1 K	1/6 W
R305	QRD161J-392	CR	3.9 K	1/6 W
R306	QRD161J-562	CR	5.6 K	1/6 W
R307	QRD161J-561	CR	560	1/6 W
R308	QRD161J-102	CR	1 K	1/6 W
R309	QRD161J-223	CR	22 K	1/6 W
R310	QRD161J-153	CR	15 K	1/6 W
R311	QRD161J-102	CR	1 K	1/6 W
R312	QRD161J-122	CR	1.2 K	1/6 W
R313	QRD161J-392	CR	3.9 K	1/6 W
R314	QRD161J-105	CR	1 M	1/6 W
R315	QRD161J-223	CR	22 K	1/6 W
R316	QRD161J-123	CR	12 K	1/6 W
R317	QRD161J-221	CR	220	1/6 W
R318	QRD161J-102	CR	1 K	1/6 W
R319	QRD161J-273	CR	27 K	1/6 W
R320	QRD161J-273	CR	27 K	1/6 W

Symbol No.	Part No.	Part Name	Description	
R321	QRD161J-221	CR	220	1/6 W
R322	QRD161J-103	CR	10 K	1/6 W
R323	QRD161J-223	CR	22 K	1/6 W
R324	QRD161J-273	CR	27 K	1/6 W
R325	QRD161J-104	CR	100 K	1/6 W
R326	QRD161J-223	CR	22 K	1/6 W
R327	QRD161J-221	CR	220	1/6 W
R328	QRD161J-391	CR	390	1/6 W
R329	QRD161J-221	CR	220	1/6 W
R330	QRD161J-103	CR	10 K	1/6 W
R331	QRD161J-273	CR	27 K	1/6 W
R332	QRD161J-332	CR	3.3 K	1/6 W
R333	QRD161J-471	CR	470	1/6 W
R334	QRD161J-471	CR	470	1/6 W
R335	QRD161J-332	CR	3.3 K	1/6 W
R336	QRD161J-822	CR	8.2 K	1/6 W
R337	QRD161J-681	CR	680	1/6 W
R338	QRD161J-561	CR	560	1/6 W
R339	QRD161J-102	CR	1 K	1/6 W
R340	QRD161J-392	CR	3.9 K	1/6 W
R341	QRD161J-272	CR	2.7 K	1/6 W
R342	QRD161J-562	CR	5.6 K	1/6 W
R343	QRD161J-122	CR	1.2 K	1/6 W
R344	QRD161J-222	CR	2.2 K	1/6 W
R345	QRD161J-223	CR	22 K	1/6 W
R346	QRD161J-223	CR	22 K	1/6 W
R347	QRD161J-152	CR	1.5 K	1/6 W
R348	QRD161J-471	CR	470	1/6 W
R349	QRD161J-471	CR	470	1/6 W
R350	QRD161J-102	CR	1 K	1/6 W
R351	QRD161J-102	CR	1 K	1/6 W
R352	QRD161J-153	CR	15 K	1/6 W
R353	QRD161J-223	CR	22 K	1/6 W
R354	QRD161J-223	CR	22 K	1/6 W
R355	QRD161J-273	CR	27 K	1/6 W
R356	QRD161J-102	CR	1 K	1/6 W
R357	QRD161J-102	CR	1 K	1/6 W
R358	QRD161J-271	CR	270	1/6 W
R359	QRD161J-102	CR	1 K	1/6 W
R360	QRD161J-102	CR	1 K	1/6 W
R361	QRD161J-183	CR	18 K	1/6 W
R362	QRD161J-153	CR	15 K	1/6 W
R363	QRD161J-222	CR	2.2 K	1/6 W
R364	QRD161J-221	CR	220	1/6 W
R365	QRD161J-471	CR	470	1/6 W
R366	QRD161J-221	CR	220	1/6 W
R367	QRD161J-471	CR	470	1/6 W
R368	QRD161J-471	CR	470	1/6 W
R369	QRD161J-471	CR	470	1/6 W
R370	QRD161J-223	CR	22 K	1/6 W
R371	QRD161J-563	CR	56 K	1/6 W
R372	QRD161J-561	CR	560	1/6 W
R373	QRD161J-392	CR	3.9 K	1/6 W
R374	QRD161J-221	CR	220	1/6 W
R375	QRD161J-471	CR	470	1/6 W
R376	QRD161J-223	CR	22 K	1/6 W
R377	QRD161J-221	CR	220	1/6 W
R378	QRD161J-102	CR	1 K	1/6 W
R379	QRD161J-102	CR	1 K	1/6 W
R380	QRD161J-272	CR	2.7 K	1/6 W

Symbol No.	Part No.	Part Name	Description	
R381	QRD161J-223	CR	22 K	1/6 W
R382	QRD161J-153	CR	15 K	1/6 W
R383	QRD161J-102	CR	1 K	1/6 W
R384	QRD161J-102	CR	1 K	1/6 W
R385	QRD161J-102	CR	1 K	1/6 W
R386	QRD161J-102	CR	1 K	1/6 W
R387	QRD161J-223	CR	22 K	1/6 W
R388	QRD161J-153	CR	15 K	1/6 W
R389	QRD161J-103	CR	10 K	1/6 W
R390	QRD161J-221	CR	220	1/6 W
R391	QRD161J-221	CR	220	1/6 W
R392	QRD161J-103	CR	10 K	1/6 W
R393	QRD161J-223	CR	22 K	1/6 W
R394	QRD161J-221	CR	220	1/6 W
R395	QRD161J-273	CR	27 K	1/6 W
R396	QRD161J-273	CR	27 K	1/6 W
R397	QRD161J-102	CR	1 K	1/6 W
R398	QRD161J-102	CR	1 K	1/6 W
R399	QRD161J-222	CR	2.2 K	1/6 W
R400	QRD161J-103	CR	10 K	1/6 W
R401	QRD161J-152	CR	1.5 K	1/6 W
R402	QRD161J-152	CR	1.5 K	1/6 W
R403	QRD161J-152	CR	1.5 K	1/6 W
R404	QRD161J-152	CR	1.5 K	1/6 W
R406	QRD161J-332	CR	3.3 K	1/6 W
R407	QRD161J-332	CR	3.3 K	1/6 W
R408	QRD161J-332	CR	3.3 K	1/6 W
R409	QRD161J-392	CR	3.9 K	1/6 W
R410	QRD161J-102	CR	1 K	1/6 W
R411	QRD161J-102	CR	1 K	1/6 W
R412	QRD161J-101	CR	100	1/6 W
R413	QRD161J-103	CR	10 K	1/6 W
R414	QRD161J-103	CR	10 K	1/6 W
R415	QRD161J-681	CR	680	1/6 W
R416	QRD161J-104	CR	100 K	1/6 W
R417	QRD161J-103	CR	10 K	1/6 W
R418	QRD161J-103	CR	10 K	1/6 W
R419	QRD161J-105	CR	1 M	1/6 W
R420	QRD161J-105	CR	1 M	1/6 W
R421	QRD161J-123	CR	12 K	1/6 W
R422	QRD161J-562	CR	5.6 K	1/6 W
R423	QRD161J-392	CR	3.9 K	1/6 W
R424	QRD161J-561	CR	560	1/6 W
R425	QRD161J-182	CR	1.8 K	1/6 W
R426	QRD161J-102	CR	1 K	1/6 W
R427	QRD161J-102	CR	1 K	1/6 W
R428	QRD161J-562	CR	5.6 K	1/6 W
R429	QRD161J-103	CR	10 K	1/6 W
R430	QRD161J-394	CR	390 K	1/6 W
R431	QRD161J-222	CR	2.2 K	1/6 W
R432	QRD161J-222	CR	2.2 K	1/6 W
R433	QRD161J-224	CR	220 K	1/6 W
R434	QRD161J-473	CR	47 K	1/6 W
R435	QRD161J-183	CR	18 K	1/6 W
R436	QRD161J-471	CR	470	1/6 W
R437	QRD161J-182	CR	1.8 K	1/6 W
R438	QRD161J-561	CR	560	1/6 W
R439	QRD161J-561	CR	560	1/6 W
R440	QRD161J-271	CR	270	1/6 W

Symbol No.	Part No.	Part Name	Description
R441	QRD161J-821	CR	820 1/6 W
R442	QRD161J-272	CR	2.7 K 1/6 W
R443	QRD161J-682	CR	6.8 K 1/6 W
R444	QRD161J-223	CR	22 K 1/6 W
R445	QRD161J-272	CR	2.7 K 1/6 W
R446	QRD161J-271	CR	270 1/6 W
R447	QRD161J-561	CR	560 1/6 W
R448	QRD161J-561	CR	560 1/6 W
R449	QRD161J-470	CR	47 1/6 W
R450	QRD161J-102	CR	1 K 1/6 W
R451	QRD161J-683	CR	68 K 1/6 W
R452	QRD161J-333	CR	33 K 1/6 W
R453	QRD161J-471	CR	470 1/6 W
R454	QRD161J-561	CR	560 1/6 W
R455	QRD161J-103	CR	10 K 1/6 W
R456	QRD161J-471	CR	470 1/6 W
R501	QVPB613-202	VR	2 K DMO Y EQ
R502	QVPB613-102	VR	1 K Y GAIN
R503	QVPB613-203	VR	20 K AFC
R504	QVPB613-102	VR	1 K DMO R-Y EQ
R505	QVPB613-102	VR	1 K R-Y GAIN
R506	QVPB613-102	VR	1 K DMO B-Y EQ
R507	QVPB613-102	VR	1 K B-Y GAIN
R508	QVPB613-501	VR	500 VTR Y LEVEL
R509	QVPB613-202	VR	2 K VTR Y EQ
R510	QVPB613-501	VR	500 VTR R-Y LEVEL
R511	QVPB613-202	VR	2 K VTR R-Y EQ
R512	QVPB613-501	VR	500 VTR B-Y LEVEL
R513	QVPB613-202	VR	2 K VTR B-Y EQ
R514	QVPB613-502	VR	5 K BFP PSTN
R515	QVPB614-102	VR	1 K DOC LEVEL
R516	SCV1200-103	VR	10 K U/V BALANCE
R517	SCV1200-103	VR	10 K CHROMA LEVEL
R518	SCV1200-103	VR	10 K VIDEO LEVEL
R519	QVPB613-103	VR	10 K BURST STOP
R520	QVPB613-103	VR	10 K BURST START
R521	QVPB613-202	VR	2 K TBC R-Y EQ
R522	QVPB613-202	VR	2 K BURST LEVEL
R523	QVPB613-202	VR	2 K BURST PHASE
R524	QVPB613-102	VR	1 K TBC R-Y LEVEL
R525	QVPB613-102	VR	1 K C BAL 1
R526	QVPB613-102	VR	1 K C BAL 2
R527	QVPB613-102	VR	1 K C BAL 3
R528	QVPB613-102	VR	1 K S-C LEVEL
R529	QVPB613-501	VR	500 C BAL 4
R530	QVPB613-202	VR	2 K TBC B-Y EQ
R531	QVPB613-102	VR	1 K TBC B-Y LEVEL
R532	QVPB613-501	VR	500 QUAD
R533	QVPB613-202	VR	2 K TBC Y EQ
R534	QVPB613-203	VR	20 K SYNC LEVEL
R535	QVPB613-102	VR	1 K Y/C MIX LEVEL
R536	QVPB613-502	VR	5 K B-B SYNC LEVEL
R537	QVPB613-102	VR	1 K DUB C LEVEL
R538	QVPB613-202	VR	2 K R-Y LEVEL
R539	QVPB613-202	VR	2 K B-Y LEVEL
R540	QVPB613-202	VR	2 K VIDEO 2 LEVEL
R541	QVPB613-202	VR	2 K VIDEO 1 LEVEL
R542	QVPB613-202	VR	2 K DUB Y LEVEL
R543	QVPB613-202	VR	2 K Y LEVEL
R544	QVPB613-102	VR	1 K B.B. LEVEL
R545	QVPB613-103	VR	10 K B.B. STOP

Symbol No.	Part No.	Part Name	Description
R546	QVPB613-103	VR	10 K B.B. START
R548	QVPB613-203	VR	20 K PILOT PSTN
R549	QVPB613-203	VR	20 K PILOT WIDTH
R550	QVPB613-102	VR	1 K PILOT PHASE
R551	QVPB613-102	VR	1 K PILOT LEVEL
R552	QVPB613-501	VR	500 AFC
C1	QER41CM-476	E Cap	47 16 V
C2	QCT25UJ-470	C Cap	47 P
C3	QCT25UJ-101	C Cap	100 P
C4	QCT25UJ-101	C Cap	100 P
C5	QCT25UJ-101	C Cap	100 P
C6	QCT25UJ-470	C Cap	47 P
C7	QER41CM-476	E Cap	47 16 V
C8	QCT25UJ-101	C Cap	100 P
C9	QER41CM-106	E Cap	10 16 V
C10	QCT25CH-120	C Cap	12 P
C11	QER41CM-476	E Cap	47 16 V
C12	QER41CM-476	E Cap	47 16 V
C13	QER41CM-476	E Cap	47 16 V
C14	QER41CM-476	E Cap	47 16 V
C15	QER41CM-476	E Cap	47 16 V
C16	QCT25UJ-270	C Cap	27 P
C17	QCT25UJ-270	C Cap	27 P
C18	QCT25UJ-470	C Cap	47 P
C19	QCT25UJ-470	C Cap	47 P
C20	QFN41HJ-103	MY Cap	0.01 50 V
C21	QFN41HJ-103	MY Cap	0.01 50 V
C22	QFN41HJ-103	MY Cap	0.01 50 V
C23	QCT25CH-221	C Cap	220 P
C24	QCZ0206-104	C Cap	0.1
C25	QCZ0206-104	C Cap	0.1
C26	QEJ41VM-474	TA Cap	0.47 35 V
C27	QCZ0206-104	C Cap	0.1
C28	QER41CM-476	E Cap	47 16 V
C29	QFN41HJ-154	MY Cap	0.15 50 V
C30	QCT25CH-330	C Cap	33 P
C31	QCT25CH-470	C Cap	47 P
C32	QFN41HJ-273	MY Cap	0.027 50 V
C33	QEPA1CM-106	BP Cap	10 16 V
C34	QFN41HJ-683	MY Cap	0.068 50 V
C35	QCT25UJ-560	C Cap	56 P
C36	QCT25UJ-221	C Cap	220 P
C37	QCT25UJ-221	C Cap	220 P
C38	QCT25UJ-560	C Cap	56 P
C39	QCT25UJ-331	C Cap	330 P
C40	QEPC1CM-106	BP Cap	10 16 V
C41	QER41CM-476	E Cap	47 16 V
C42	QCT25UJ-560	C Cap	56 P
C43	QCT25UJ-221	C Cap	220 P
C44	QCT25UJ-221	C Cap	220 P

Symbol No.	Part No.	Part Name	Description	
C45	QCT25UJ-560	C Cap	56 P	
C46	QCT25UJ-331	C Cap	330 P	
C47	QEPA1CM-106	BP Cap	10	16 V
C48	QER41CM-476	E Cap	47	16 V
C49	QER41CM-476	E Cap	47	16 V
C50	QER41CM-476	E Cap	47	16 V
C51	QER41CM-106	E Cap	10	16 V
C52	QER41CM-106	E Cap	10	16 V
C53	QCT25CH-330	C Cap	33 P	
C54	QCT25UJ-220	C Cap	22 P	
C55	QCT25UJ-101	C Cap	100 P	
C56	QCT25UJ-101	C Cap	100 P	
C57	QCT25UJ-220	C Cap	22 P	
C58	QCT25UJ-270	C Cap	27 P	
C59	QEPA1HM-105	BP Cap	1	50 V
C60	QER41CM-476	E Cap	47	16 V
C61	QCT25UJ-330	C Cap	33 P	
C62	QER41CM-106	E Cap	10	16 V
C63	QER41CM-106	E Cap	10	16 V
C64	QER41CM-106	E Cap	10	16 V
C66	QCT25UJ-470	C Cap	47 P	
C67	QCT25UJ-181	C Cap	180 P	
C68	QCT25UJ-181	C Cap	180 P	
C69	QCT25UJ-820	C Cap	82 P	
C70	QCT25UJ-680	C Cap	68 P	
C71	QCT25UJ-390	C Cap	39 P	
C72	QCT25UJ-820	C Cap	82 P	
C74	QER41CM-476	E Cap	47	16 V
C75	QCT25UJ-121	C Cap	120 P	
C76	QER41CM-106	E Cap	10	16 V
C77	QER41CM-106	E Cap	10	16 V
C78	QER41CM-106	E Cap	10	16 V
C80	QCT25UJ-470	C Cap	47 P	
C81	QCT25UJ-181	C Cap	180 P	
C82	QCT25UJ-181	C Cap	180 P	
C83	QCT25UJ-470	C Cap	47 P	
C84	QCT25UJ-820	C Cap	82 P	
C85	QEPA1HM-105	BP Cap	1	50 V
C86	QER41CM-476	E Cap	47	16 V
C87	QCT25UJ-121	C Cap	120 P	
C88	QER41CM-106	E Cap	10	16 V
C89	QER41CM-476	E Cap	47	16 V
C90	QER41CM-476	E Cap	47	16 V
C91	QCT25CH-121	C Cap	120 P	
C92	QCT25CH-680	C Cap	68 P	
C93	QER41EM-475	E Cap	4.7	25 V
C94	QCZ0206-104	C Cap	0.1	
C95	QCZ0206-104	C Cap	0.1	
C96	QCZ0206-104	C Cap	0.1	
C97	QFN41HJ-102	MY Cap	1000 P	50 V
C98	QCZ0206-104	C Cap	0.1	
C99	QCZ0206-104	C Cap	0.1	
C100	QCT25CH-560	C Cap	56 P	
C101	QER41HM-105	E Cap	1	50 V
C102	QFN41HJ-103	MY Cap	0.01	50 V
C103	QER41HM-105	E Cap	1	50 V

Symbol No.	Part No.	Part Name	Description	
C104	QCZ0206-104	C Cap	0.1	
C105	QCZ0206-104	C Cap	0.1	
C106	QFN41HJ-392	MY Cap	3900 P	50 V
C107	QCT25CH-101	C Cap	100 P	
C108	QCT25CH-680	C Cap	68 P	
C109	QER41HM-105	E Cap	1	50 V
C110	QER41HM-105	E Cap	1	50 V
C111	QCZ0206-104	C Cap	0.1	
C112	QEPA1HM-105	BP Cap	1	50 V
C113	QEPA1HM-105	BP Cap	1	50 V
C114	QER41CM-106	E Cap	10	16 V
C115	QCT25CH-221	C Cap	220 P	
C116	QER41HM-105	E Cap	1	50 V
C117	QCZ0206-104	C Cap	0.1	
C118	QCZ0206-104	C Cap	0.1	
C119	QEPA1HM-105	BP Cap	1	50 V
C120	QCZ0206-104	C Cap	0.1	
C121	QCZ0206-104	C Cap	0.1	
C122	QCT25CH-220	C Cap	22 P	
C123	QCT25UJ-470	C Cap	47 P	
C124	QCT25UJ-181	C Cap	180 P	
C125	QCT25UJ-181	C Cap	180 P	
C126	QCT25UJ-470	C Cap	47 P	
C127	QCT25UJ-820	C Cap	82 P	
C128	QCT25UJ-121	C Cap	120 P	
C129	QEPA1CM-106	BP Cap	10	16 V
C130	QEPA1CM-106	BP Cap	10	16 V
C131	QCT25CH-330	C Cap	33 P	
C132	QER41CM-476	E Cap	47	16 V
C133	QCT25CH-121	C Cap	120P	
C134	QCT25CH-560	C Cap	56 P	
C135	QEJ41VM-104	TA Cap	0.1	35 V
C136	QER41CM-476	E Cap	47	16 V
C137	QCZ0206-104	C Cap	0.1	
C138	QCZ0206-104	C Cap	0.1	
C139	QCZ0206-104	C Cap	0.1	
C140	QFN41HJ-103	MY Cap	0.01	50 V
C141	QFN41HJ-103	MY Cap	0.01	50 V
C142	QCT25UJ-390	C Cap	39 P	
C143	QCT25UJ-330	C Cap	33 P	
C144	QCT25UJ-180	C Cap	18 P	
C145	QCT25UJ-121	C Cap	120 P	
C146	QER41HM-105	E Cap	1	50 V
C147	QFN41HJ-103	MY Cap	0.01	50 V
C148	QEJ41VM-474	TA Cap	0.47	35 V
C149	QER41HM-105	E Cap	1	50 V
C150	QCZ0206-104	C Cap	0.1	
C151	QFN41HJ-103	MY Cap	0.01	50 V
C152	QFN41HJ-103	MY Cap	0.01	50 V
C153	QCT25UJ-470	C Cap	47 P	
C154	QCT25UJ-820	C Cap	82 P	
C155	QCT25UJ-470	C Cap	47 P	
C156	QCT25UJ-4R0	C Cap	4 P	
C157	QCT25UJ-180	C Cap	18 P	
C158	QER41CM-106	E Cap	10	16 V
C159	QER41HM-105	E Cap	1	50 V
C160	QER41HM-105	E Cap	1	50 V
C161	QER41HM-105	E Cap	1	50 V
C162	QCT25UJ-470	C Cap	47 P	

Symbol No.	Part No.	Part Name	Description	
C163	QCT25UJ-181	C Cap	180 P	
C164	QCT25UJ-181	C Cap	180 P	
C165	QCT25UJ-820	C Cap	82 P	
C166	QCT25UJ-680	C Cap	68 P	
C167	QCT25UJ-390	C Cap	39 P	
C168	QCT25UJ-820	C Cap	82 P	
C169	QCT25UJ-121	C Cap	120 P	
C170	QEPA1CM-106	BP Cap	10	16 V
C171	QEPA1CM-106	BP Cap	10	16 V
C172	QER41CM-476	E Cap	47	16 V
C173	QCT25CH-121	C Cap	120 P	
C174	QCT25CH-560	C Cap	56 P	
C175	QEJ41VM-104	TA Cap	0.1	35 V
C176	QCZ0206-104	C Cap	0.1	
C177	QCZ0206-104	C Cap	0.1	
C178	QFN41HJ-103	MY Cap	0.01	50 V
C179	QFN41HJ-103	MY Cap	0.01	50 V
C180	QCZ0206-104	C Cap	0.1	
C181	QCZ0206-104	C Cap	0.1	
C182	QCZ0206-104	C Cap	0.1	
C183	QCT25UJ-121	C Cap	120 P	
C184	QFN41HJ-103	MY Cap	0.01	50 V
C185	QCT25CH-121	C Cap	120 P	
C186	QER41HM-105	E Cap	1	50 V
C187	QCT25UJ-220	C Cap	22 P	
C188	QCT25UJ-101	C Cap	100 P	
C189	QCT25UJ-101	C Cap	100 P	
C190	QCT25UJ-220	C Cap	22 P	
C191	QCT25UJ-270	C Cap	27 P	
C192	QCT25UJ-330	C Cap	33 P	
C193	QCT25CH-390	C Cap	39 P	
C194	QER41CM-476	E Cap	47	16 V
C195	QCT25CH-680	C Cap	68 P	
C196	QER41CM-476	E Cap	47	16 V
C197	QER41CM-476	E Cap	47	16 V
C199	QEPA1HM-105	BP Cap	1	50 V
C200	QER41CM-476	E Cap	47	16 V
C201	QER41CM-476	E Cap	47	16 V
C202	QER41CM-476	E Cap	47	16 V
C203	QCT25CH-680	C Cap	68 P	
C204	QER41CM-476	E Cap	47	16 V
C205	QER41CM-476	E Cap	47	16 V
C206	QER41HM-105	E Cap	1	50 V
C207	QER41CM-476	E Cap	47	16 V
C208	QCT25CH-101	C Cap	100 P	
C209	QFN41HJ-154	MY Cap	0.15	50 V
C210	QFN41HJ-103	MY Cap	0.01	50 V
C211	QER41CM-476	E Cap	47	16 V
C212	QER41CM-106	E Cap	10	16 V
C213	QCT25CH-221	C Cap	220 P	
C214	QCT25CH-221	C Cap	220 P	
C215	QFN41HJ-103	MY Cap	0.01	50 V
C216	QCT25CH-101	C Cap	100 P	
C217	QFN41HJ-103	MY Cap	0.01	50 V
C218	QFN41HJ-103	MY Cap	0.01	50 V
C219	QFN41HJ-103	MY Cap	0.01	50 V
C220	QER41CM-476	E Cap	47	16 V
C221	QFN41HJ-103	MY Cap	0.01	50 V

Symbol No.	Part No.	Part Name	Description	
C222	QFN41HJ-103	MY Cap	0.01	50 V
C223	QFN41HJ-102	MY Cap	1000 P	50 V
C224	QER41CM-106	E Cap	10	16 V
C225	QFN41HJ-183	MY Cap	0.018	50 V
C226	QCT25CH-121	C Cap	120 P	
C227	QCT25CH-181	C Cap	180 P	
C228	QCT25CH-221	C Cap	220 P	
C229	QFN41HJ-102	MY Cap	1000 P	50 V
C230	QER41CM-476	E Cap	47	16 V
C231	QER41CM-476	E Cap	47	16 V
C232	QCZ0206-104	C Cap	0.1	
C233	QER41HM-105	E Cap	1	50 V
C234	QCZ0206-104	C Cap	0.1	
C235	QEPA1HM-105	BP Cap	1	50 V
C236	QCT25CH-150	C Cap	15 P	
C237	QFN41HJ-103	MY Cap	0.01	50 V
C238	QFN41HJ-103	MY Cap	0.01	50 V
C239	QFN41HJ-103	MY Cap	0.01	50 V
C240	QFN41HJ-103	MY Cap	0.01	50 V
C241	QER41CM-106	E Cap	10	16 V
C242	QFN41HJ-103	MY Cap	0.01	50 V
C243	QCT25CH-3R0	C Cap	3 P	
C244	QAT3001-011	T Cap	18 P	VCO
C245	QCT25CH-330	C Cap	33 P	
C246	QCT25CH-100	C Cap	10 P	
C247	QER41CM-476	E Cap	47	16 V
C248	QCZ0206-104	C Cap	0.1	
C249	QCZ0206-104	C Cap	0.1	
C250	QFN41HJ-103	MY Cap	0.01	50 V
C251	QCZ0206-104	C Cap	0.1	
C252	QCT25CH-101	C Cap	100 P	
C253	QCT25CH-101	C Cap	100 P	
C300	QER41CM-476	E Cap	47	16 V
C301	QER41CM-476	E Cap	47	16 V
C302	QER41CM-476	E Cap	47	16 V
C303	QER41CM-476	E Cap	47	16 V
C304	QER41CM-476	E Cap	47	16 V
C305	QER41CM-476	E Cap	47	16 V
C306	QER41CM-476	E Cap	47	16 V
C307	QER41CM-476	E Cap	47	16 V
C308	QER41CM-476	E Cap	47	16 V
C309	QER41CM-476	E Cap	47	16 V
C310	QER41CM-476	E Cap	47	16 V
C311	QER41CM-476	E Cap	47	16 V
C312	QER41CM-476	E Cap	47	16 V
C313	QER41CM-476	E Cap	47	16 V
C314	QER41CM-476	E Cap	47	16 V
C315	QER41CM-476	E Cap	47	16 V
C316	QER41CM-476	E Cap	47	16 V
C317	QER41CM-476	E Cap	47	16 V
C318	QER41CM-476	E Cap	47	16 V
C319	QER41CM-476	E Cap	47	16 V
C320	QER41CM-476	E Cap	47	16 V
C321	QER41CM-476	E Cap	47	16 V
C322	QER41CM-476	E Cap	47	16 V
C323	QER41CM-476	E Cap	47	16 V
C324	QER41CM-476	E Cap	47	16 V
C325	QER41CM-476	E Cap	47	16 V

Symbol No.	Part No.	Part Name	Description
C326	QER41CM-476	E Cap	47 16 V
C327	QER41CM-476	E Cap	47 16 V
C328	QER41CM-476	E Cap	47 16 V
C329	QER41CM-476	E Cap	47 16 V
C330	QER41CM-476	E Cap	47 16 V
C331	QER41CM-476	E Cap	47 16 V
C332	QER41CM-476	E Cap	47 16 V
C333	QER41CM-476	E Cap	47 16 V
C334	QER41CM-476	E Cap	47 16 V
C335	QCZ0206-104	C Cap	0.1
C336	QCZ0206-104	C Cap	0.1
C337	QCZ0206-104	C Cap	0.1
C338	QCZ0206-104	C Cap	0.1
C339	QCZ0206-104	C Cap	0.1
C340	QCZ0206-104	C Cap	0.1
C341	QCZ0206-104	C Cap	0.1
C342	QCZ0206-104	C Cap	0.1
C343	QCZ0206-104	C Cap	0.1
C345	QCZ0206-104	C Cap	0.1
C346	QCZ0206-104	C Cap	0.1
C347	QCZ0206-104	C Cap	0.1
C348	QCZ0206-104	C Cap	0.1
C349	QCZ0206-104	C Cap	0.1
C350	QCZ0206-104	C Cap	0.1
C351	QCZ0206-104	C Cap	0.1
C352	QCZ0206-104	C Cap	0.1
C353	QCZ0206-104	C Cap	0.1
C354	QER41CM-476	E Cap	47 16 V
C355	QER41CM-476	E Cap	47 16 V
C356	QER41CM-476	E Cap	47 16 V
C357	QER41CM-476	E Cap	47 16 V
C358	QER41CM-476	E Cap	47 16 V
C359	QER41CM-476	E Cap	47 16 V
C360	QER41CM-476	E Cap	47 16 V
C361	QER41CM-476	E Cap	47 16 V
C362	QER41CM-476	E Cap	47 16 V
C363	QER41CM-476	E Cap	47 16 V
C364	QER41CM-476	E Cap	47 16 V
C365	QER41CM-476	E Cap	47 16 V
C366	QER41CM-476	E Cap	47 16 V
C367	QER41CM-476	E Cap	47 16 V
C368	QER41CM-476	E Cap	47 16 V
C369	QER41CM-476	E Cap	47 16 V
C370	QER41CM-476	E Cap	47 16 V
C371	QER41CM-476	E Cap	47 16 V
C372	QER41CM-476	E Cap	47 16 V
C373	QER41CM-476	E Cap	47 16 V
C374	QER41CM-476	E Cap	47 16 V
C375	QER41CM-476	E Cap	47 16 V
C376	QCZ0206-104	C Cap	0.1
C377	QCZ0206-104	C Cap	0.1
C378	QCZ0206-104	C Cap	0.1
C379	QCZ0206-104	C Cap	0.1
C380	QCZ0206-104	C Cap	0.1
C381	QCZ0206-104	C Cap	0.1
C382	QCZ0206-104	C Cap	0.1
C383	QCZ0206-104	C Cap	0.1
C384	QCZ0206-104	C Cap	0.1

Symbol No.	Part No.	Part Name	Description
C385	QCZ0206-104	C Cap	0.1
C386	QCZ0206-104	C Cap	0.1
C387	QER41CM-476	E Cap	47 16 V
C388	QER41CM-476	E Cap	47 16 V
C389	QCZ0206-104	C Cap	0.1
C390	QCZ0206-104	C Cap	0.1
C391	QCZ0206-104	C Cap	0.1
C392	QCZ0206-104	C Cap	0.1
C393	QER41CM-476	E Cap	47 16 V
L1	SCV0331-680	Peaking Coil	68 μH
L2	SCV0331-820	Peaking Coil	82 μH
L3	SCV0331-820	Peaking Coil	82 μH
L4	SCV0331-680	Peaking Coil	68 μH
L6	SCV0331-220	Peaking Coil	22 μH
L7	SCV0331-560	Peaking Coil	56 μH
L8	SCV0331-270	Peaking Coil	27 μH
L9	SCV0331-8R2	Peaking Coil	8.2 μH
L10	SCV0331-101	Peaking Coil	100 μH
L11	SCV0331-181	Peaking Coil	180 μH
L12	SCV0331-101	Peaking Coil	100 μH
L13	SCV0331-330	Peaking Coil	33 μH
L14	SCV0331-101	Peaking Coil	100 μH
L15	SCV0331-181	Peaking Coil	180 μH
L16	SCV0331-101	Peaking Coil	100 μH
L17	SCV0331-330	Peaking Coil	33 μH
L18	SCV0331-150	Peaking Coil	15 μH
L19	SCV0331-220	Peaking Coil	22 μH
L20	SCV0331-150	Peaking Coil	15 μH
L21	SCV0331-220	Peaking Coil	22 μH
L22	SCV0331-270	Peaking Coil	27 μH
L23	SCV0331-470	Peaking Coil	47 μH
L24	SCV0331-270	Peaking Coil	27 μH
L25	SCV0331-150	Peaking Coil	15 μH
L26	SCV0331-150	Peaking Coil	15 μH
L27	SCV0331-220	Peaking Coil	22 μH
L28	SCV0331-270	Peaking Coil	27 μH
L29	SCV0331-470	Peaking Coil	47 μH
L30	SCV0331-270	Peaking Coil	27 μH
L31	SCV0331-220	Peaking Coil	22 μH
L32	SCV0331-270	Peaking Coil	27 μH
L33	SCV0331-470	Peaking Coil	47 μH
L34	SCV0331-270	Peaking Coil	27 μH
L35	SCV0331-220	Peaking Coil	22 μH
L36	SCV0331-100	Peaking Coil	10 μH
L37	SCV0331-390	Peaking Coil	39 μH
L38	SCV0331-680	Peaking Coil	68 μH
L39	SCV0331-680	Peaking Coil	68 μH
L40	SCV0331-270	Peaking Coil	27 μH

Symbol No.	Part No.	Part Name	Description
L41	SCV0331-470	Peaking Coil	47 μH
L42	SCV0331-270	Peaking Coil	27 μH
L43	SCV0331-150	Peaking Coil	15 μH
L44	SCV0331-150	Peaking Coil	15 μH
L45	SCV0331-220	Peaking Coil	22 μH
L46	SCV0331-220	Peaking Coil	22 μH
L47	SCV0331-150	Peaking Coil	15 μH
L48	SCV0331-220	Peaking Coil	22 μH
L49	SCV0331-150	Peaking Coil	15 μH
L50	SCV0331-220	Peaking Coil	22 μH
* L51	SCV0331-4R7	Peaking Coil	4.7 μH
L52	SCV0331-560	Peaking Coil	56 μH
LC1	EXC-EMT271BT	EMI Filter	
LC2	EXC-EMT271BT	EMI Filter	
CF1	SFE5.06MB	Ceramic Filter	5.06 MHz
CT1	TPS4.43MJ	Ceramic Trap	4.43 MHz
DL1	SCV1530-001	Delay Line	1 H
DL2	SCV0639-001	Delay Line	0.3 μsec
DL3	SCV0639-001	Delay Line	0.3 μsec
DL4	SCV0639-001	Delay Line	0.3 μsec
T1	SCV0171-001	Trans.	MATRIX
X1	SCV1305-002	Crystal	4.43 MHz
X2	SCV1565-001	Crystal	4.43 MHz
S1	SCV1149-001	Short Plug	
S2	SCV1149-001	Short Plug	
SW1	SCV1199-001	Toggle Switch	UNITY/VARITY
SW2	SCV1199-001	Toggle Switch	UNITY/VARITY
SW3	SCV1199-001	Toggle Switch	UNITY/VARITY
SW4	SCV1199-001	Toggle Switch	UNITY/VARITY
J1	SCV1147-001	Post Header	
J2	SCV1147-001	Post Header	
CN27	SCV1197-090	Connector	90-pin

Symbol No.	Part No.	Part Name	Description
• CBM1	**CBMC4240-00A**	**OUT-1 CBM**	
• CBM3	**CBMC4240-00A**	**OUT-1 CBM**	
• CBM5	**CBMC4240-00A**	**OUT-1 CBM**	
• CBM6	**CBMC4240-00A**	**OUT-1 CBM**	
• CBM8	**CBMC4240-00A**	**OUT-1 CBM**	
Q1	2SC2814(F4.5)	Transistor	MATSUSHITA
Q2	2SC2814(F4.5)	Transistor	MATSUSHITA
Q3	2SC2814(F4.5)	Transistor	MATSUSHITA
R1	NRSA02J-394	Chip R	390 K 1/10 W
R2	NRSA02J-473	Chip R	47 K 1/10 W
R3	NRSA02J-472	Chip R	4.7 K 1/10 W
R4	NRSA02J-822	Chip R	8.2 K 1/10 W
R5	NRSA02J-102	Chip R	1 K 1/10 W
R6	NRSA02J-152	Chip R	1.5 K 1/10 W
R7	NRSA02J-750	Chip R	75 1/10 W
C1	NCF21HZ-473	C Cap	0.047 50 V
C2	NCF21HZ-473	C Cap	0.047 50 V
C3	NCT03CH-120	C Cap	12 P 50 V
• CBM2	**CBMC4240-00B**	**OUT-2 CBM**	
• CBM4	**CBMC4240-00B**	**OUT-2 CBM**	
• CBM7	**CBMC4240-00B**	**OUT-2 CBM**	
Q1	2SC2814(F4.5)	Transistor	MATSUSHITA
Q2	2SC2814(F4.5)	Transistor	MATSUSHITA
Q3	2SC2814(F4.5)	Transistor	MATSUSHITA
R1	NRSA02J-105	Chip R	1 M 1/10 W
R2	—	—	
R3	NRSA02J-472	Chip R	4.7 K 1/10 W
R4	NRSA02J-822	Chip R	8.2 K 1/10 W
R5	NRSA02J-102	Chip R	1 K 1/10 W
R6	NRSA02J-152	Chip R	1.5 K 1/10 W
R7	NRSA02J-750	Chip R	75 1/10 W
C1	NCF21HZ-473	C Cap	0.047 50 V
C2	NCF21HZ-473	C Cap	0.047 50 V
C3	NCT03CH-120	C Cap	12 P 50 V
• CBM9	**CBMC4242-00A**	**SYNC AMP CBM**	
Q1	2SC2814(F4.5)	Transistor	MATSUSHITA
Q2	2SA1256(E4.5)	Transistor	SANYO
Q3	2SA1179(M5.6)	Transistor	SANYO
Q4	2SA1179(M5.6)	Transistor	SANYO
Q5	2SA1179(M5.6)	Transistor	SANYO

7.7 MEMORY board assembly [0][7] [0][7]□□□□□□

Symbol No.	Part No.	Part Name	Description	
R1	NRSA02J-222	Chip R	2.2 K	1/10 W
R2	NRSA02J-222	Chip R	2.2 K	1/10 W
R3	NRSA02J-182	Chip R	1.8 K	1/10 W
R4	NRSA02J-222	Chip R	2.2 K	1/10 W
R5	NRSA02J-562	Chip R	5.6 K	1/10 W
R6	NRSA02J-392	Chip R	3.9 K	1/10 W
R7	NRSA02J-183	Chip R	18 K	1/10 W
R8	NRSA02J-223	Chip R	22 K	1/10 W
R9	NRSA02J-822	Chip R	8.2 K	1/10 W
R10	NRSA02J-152	Chip R	1.5 K	1/10 W
R11	NRSA02J-181	Chip R	180	1/10 W
R12	NRSA02J-220	Chip R	22	1/10 W
R13	NRSA02J-750	Chip R	75	1/10 W
C1	NCT03CH-270	C Cap	27 P	50 V
C2	NCT03CH-180	C Cap	18 P	50 V
C3	NCF21HZ-473	C Cap	0.047	50 V
C4	NCF21HZ-473	C Cap	0.047	50 V

Symbol No.	Part No.	Part Name	Description
IC1	UPD6950C	IC	NEC (AD CONV.)
	SCV1207-024	IC Socket	
IC2	UPD6950C	IC	NEC (AD CONV.)
	SCV1207-024	IC Socket	
IC3	UPD6950C	IC	NEC (AD CONV.)
	SCV1207-024	IC Socket	
IC4	UPD74HC257C	IC	NEC
IC5	UPD74HC257C	IC	NEC
IC6	—	—	
IC7	UPD74HC123AC	IC	NEC
IC8	—	—	
IC9	UPD74HC123AC	IC	NEC
IC10	NJM4556D	IC	JRC
IC11	TC74HC4066P	IC	TOSHIBA
IC12	TC5081AP	IC	TOSHIBA
IC13	UPD74HC123AC	IC	NEC
IC14	UPD74HC04C	IC	NEC
IC15	—	—	
IC16	NJM4556D	IC	JRC
IC17	UPD74HC04C	IC	NEC
IC18	UPD74HC123AC	IC	NEC
IC19	UPD74HC74C	IC	NEC
IC20	UPD74HC74C	IC	NEC
IC21	UPD74HC10C	IC	NEC
IC22	UPD74HC74C	IC	NEC
IC23	UPD74HC74C	IC	NEC
IC24	UPD74HC123AC	IC	NEC
IC25	NJM082D	IC	JRC
IC26	TC74HC4066P	IC	TOSHIBA
IC27	UPD74HC74C	IC	NEC
IC28	UPD74HC257C	IC	NEC
IC29	TC74HC40103P	IC	TOSHIBA
IC30	UPD74HC00C	IC	NEC
IC31	UPD74HC257C	IC	NEC
IC32	UPD74HC161C	IC	NEC
IC33	UPD74HC161C	IC	NEC
IC34	UPD74HC161C	IC	NEC
IC35	UPD74HC74C	IC	NEC
IC36	UPD74HC04C	IC	NEC
IC37	UPD74HC14C	IC	NEC
IC38	UPD41101C-1	IC	NEC (D-RAM)
	SCV1205-024	IC Socket	
IC39	UPD41101C-1	IC	NEC (D-RAM)
	SCV1205-024	IC Socket	
IC40	MN4700	IC	MATSUSHITA(D-RAM)
	SCV1207-040	IC Socket	
IC41	MN4700	IC	MATSUSHITA(D-RAM)
	SCV1207-040	IC Socket	
IC42	MN4700	IC	MATSUSHITA(D-RAM)
	SCV1207-040	IC Socket	
IC43	MN4700	IC	MATSUSHITA(D-RAM)
	SCV1207-040	IC Socket	
IC44	MN4700	IC	MATSUSHITA(D-RAM)
	SCV1207-040	IC Socket	
IC45	MN4700	IC	MATSUSHITA(D-RAM)
	SCV1207-040	IC Socket	
IC46	MN4700	IC	MATSUSHITA(D-RAM)
	SCV1207-040	IC Socket	
IC47	MN4700	IC	MATSUSHITA(D-RAM)
	SCV1207-040	IC Socket	

Symbol No.	Part No.	Part Name	Description
IC48	UPD42505C-50	IC	NEC (D-RAM)
	SCV1205-024	IC Socket	
IC49	UPD42505C-50	IC	NEC (D-RAM)
	SCV1205-024	IC Socket	
IC50	UPD74HC04C	IC	NEC
IC51	UPD74HC04C	IC	NEC
IC52	UPD74HC74C	IC	NEC
IC53	UPD74HC74C	IC	NEC
IC54	UPD74HC00C	IC	NEC
IC55	UPD74HC161C	IC	NEC
IC56	UPD74HC161C	IC	NEC
IC57	UPD74HC161C	IC	NEC
IC58	UPD74HC161C	IC	NEC
IC59	UPD74HC161C	IC	NEC
IC60	UPD74HC161C	IC	NEC
IC61	UPD74HC393C	IC	NEC
IC62	UPD74HC393C	IC	NEC
IC63	UPD74HC257C	IC	NEC
IC64	UPD74HC257C	IC	NEC
IC65	UPD74HC257C	IC	NEC
IC66	UPD74HC257C	IC	NEC
IC67	UPD74HC257C	IC	NEC
IC68	UPD74HC74C	IC	NEC
IC69	UPD74HC74C	IC	NEC
IC70	UPD74HC161C	IC	NEC
IC71	UPD74HC00C	IC	NEC
IC72	UPD74HC04C	IC	NEC
IC73	UPD74HC123AC	IC	NEC
IC74	UPD74HC04C	IC	NEC
IC75	UPD74HC86C	IC	NEC
IC76	UPD74HC86C	IC	NEC
IC77	UPD74HC86C	IC	NEC
IC78	UPD74HC86C	IC	NEC
IC79	UPD74HC257C	IC	NEC
IC80	UPD74HC257C	IC	NEC
IC81	UPD74HC257C	IC	NEC
IC82	UPD74HC257C	IC	NEC
IC83	UPD74HC74C	IC	NEC
IC84	UPD74HC123AC	IC	NEC
IC86	UPD6900C	IC	NEC (DA CONV.)
	SCV1206-022	IC Socket	
IC87	UPD6900C	IC	NEC (DA CONV.)
	SCV1206-022	IC Socket	
IC88	UPD6900C	IC	NEC (DA CONV.)
	SCV1206-022	IC Socket	
IC90	UPD74HC00C	IC	NEC
IC91	–	–	
IC92	UPD74HC04C	IC	NEC
IC93	UPD74HC14C	IC	NEC
IC94	UPD74HC14C	IC	NEC
IC95	NJM4556D	IC	JRC
IC96	UPD74HC161C	IC	NEC
IC97	UPD74HC161C	IC	NEC
IC98	UPD74HC161C	IC	NEC
IC99	UPD74HC123AC	IC	NEC
IC100	UPD74HC74C	IC	NEC
IC101	–	–	
IC102	UPD74HC257C	IC	NEC
IC103	UPD74HC74C	IC	NEC

Symbol No.	Part No.	Part Name	Description
IC104	SCV0322-002	Function Module	JVC
IC105	UPD74HC123AC	IC	NEC
IC106	TC5081AP	IC	TOSHIBA
IC108	UPD74HC161C	IC	NEC
IC109	UPD74HC161C	IC	NEC
IC110	UPD74HC161C	IC	NEC
IC111	UPD74HC74C	IC	NEC
IC112	UPD74HC00C	IC	NEC
IC113	TC40H000P	IC	TOSHIBA
IC114	UPD74HC00C	IC	NEC
IC115	UPD74HC04C	IC	NEC
IC116	UPD74HC367C	IC	NEC
IC117	UPD74HC14C	IC	NEC
IC118	TC4013BAP	IC	TOSHIBA
IC119	TC4013BAP	IC	TOSHIBA
IC120	MN1280(P.Q)	IC	MATSUSHITA
IC121	NJM2903D	IC	JRC
IC122	UPD74HC00C	IC	NEC
IC123	TA78L005AP	IC	TOSHIBA
Q1	2SA838(C)	Transistor	MATSUSHITA
Q2	2SA838(C)	Transistor	MATSUSHITA
Q3	2SA838(C)	Transistor	MATSUSHITA
Q4	2SA564(R)	Transistor	MATSUSHITA
Q5	2SC1685(R.S)	Transistor	MATSUSHITA
Q6	2SC829(C)	Transistor	MATSUSHITA
Q7	2SA838(C)	Transistor	MATSUSHITA
Q8	2SA838(C)	Transistor	MATSUSHITA
Q9	2SA838(C)	Transistor	MATSUSHITA
Q10	2SA564(R)	Transistor	MATSUSHITA
Q11	2SC1685(R.S)	Transistor	MATSUSHITA
Q12	DTC124ES	D. Transistor	ROHM
Q13	2SA564(R)	Transistor	MATSUSHITA
Q14	DTC124ES	D. Transistor	ROHM
Q15	DTC124ES	D. Transistor	ROHM
Q16	2SK163(M.N)	FET	NEC
Q17	2SK163(M.N)	FET	NEC
Q18	2SK163(M.N)	FET	NEC
Q19	DTA124ES	D. Transistor	ROHM
D1	GL-5HD22	LED	
	SS44280	LED Holder	
D2	GL-5HD22	LED	
	SS44280	LED Holder	
D3	GL-5HD22	LED	
	SS44280	LED Holder	
D4	GL-5HD22	LED	
	SS44280	LED Holder	
D5	MA165	Diode	MATSUSHITA
D6	MA165	Diode	MATSUSHITA
D7	MA165	Diode	MATSUSHITA
D8	MA165	Diode	MATSUSHITA
D9	SVC321(A)	VC Diode	SANYO
D10	SVC321(A)	VC Diode	SANYO

Symbol No.	Part No.	Part Name	Description
D11	SVC321(A)	VC Diode	SANYO
D12	MA165	Diode	MATSUSHITA
D13	MA165	Diode	MATSUSHITA
D15	MA165	Diode	MATSUSHITA
R1	QRD161J-333	CR	33 K 1/6 W
R2	QRD161J-222	CR	2.2 K 1/6 W
R3	QRD161J-333	CR	33 K 1/6 W
R4	QRD161J-222	CR	2.2 K 1/6 W
R5	QRD161J-333	CR	33 K 1/6 W
R6	QRD161J-222	CR	2.2 K 1/6 W
R7	QRD161J-472	CR	4.7 K 1/6 W
R8	QRD161J-562	CR	5.6 K 1/6 W
R9	QRD161J-562	CR	5.6 K 1/6 W
R10	QRD161J-821	CR	820 1/6 W
R11	QRD161J-223	CR	22 K 1/6 W
R12	QRD161J-103	CR	10 K 1/6 W
R13	QRD161J-221	CR	220 1/6 W
R14	QRD161J-821	CR	820 1/6 W
R15	QRD161J-221	CR	220 1/6 W
R16	QRD161J-103	CR	10 K 1/6 W
R17	QRD161J-273	CR	27 K 1/6 W
R18	QRD161J-152	CR	1.5 K 1/6 W
R19	QRD161J-222	CR	2.2 K 1/6 W
R20	QRD161J-102	CR	1 K 1/6 W
R21	QRD161J-221	CR	220 1/6 W
R22	QRD161J-273	CR	27 K 1/6 W
R23	QRD161J-223	CR	22 K 1/6 W
R24	QRD161J-333	CR	33 K 1/6 W
R25	QRD161J-823	CR	82 K 1/6 W
R26	QRD161J-473	CR	47 K 1/6 W
R27	QRD161J-103	CR	10 K 1/6 W
R28	QRD161J-103	CR	10 K 1/6 W
R29	QRD161J-153	CR	15 K 1/6 W
R30	QRD161J-473	CR	47 K 1/6 W
R31	QRD161J-102	CR	1 K 1/6 W
R32	QRD161J-180	CR	18 1/6 W
R33	QRD161J-103	CR	10 K 1/6 W
R34	QRD161J-102	CR	1 K 1/6 W
R35	QRD161J-103	CR	10 K 1/6 W
R36	QRD161J-333	CR	33 K 1/6 W
R37	QRD161J-332	CR	3.3 K 1/6 W
R38	QRD161J-102	CR	1 K 1/6 W
R39	QRD161J-102	CR	1 K 1/6 W
R40	QRD161J-471	CR	470 1/6 W
R41	QRD161J-221	CR	220 1/6 W
R42	QRD161J-221	CR	220 1/6 W
R43	QRD161J-221	CR	220 1/6 W
R44	QRD161J-221	CR	220 1/6 W
R45	QRD161J-221	CR	220 1/6 W
R46	QRD161J-221	CR	220 1/6 W
R47	QRD161J-273	CR	27 K 1/6 W
R48	QRD161J-104	CR	100 K 1/6 W
R49	QRD161J-332	CR	3.3 K 1/6 W
R50	QRD161J-333	CR	33 K 1/6 W

Symbol No.	Part No.	Part Name	Description
R51	QRD161J-473	CR	47 K 1/6 W
R52	QRD161J-333	CR	33 K 1/6 W
R53	QRD161J-683	CR	68 K 1/6 W
R54	QRD161J-221	CR	220 1/6 W
R55	QRD161J-221	CR	220 1/6 W
R56	QRD161J-821	CR	820 1/6 W
R57	QRD161J-221	CR	220 1/6 W
R58	QRD161J-102	CR	1 K 1/6 W
R59	QRD161J-102	CR	1 K 1/6 W
R60	QRD161J-102	CR	1 K 1/6 W
R61	QRD161J-103	CR	10 K 1/6 W
R62	QRD161J-222	CR	2.2 K 1/6 W
R63	QRD161J-152	CR	1.5 K 1/6 W
R64	QRD161J-221	CR	220 1/6 W
R65	QRD161J-821	CR	820 1/6 W
R66	QRD161J-180	CR	18 1/6 W
R67	QRD161J-180	CR	18 1/6 W
R68	QRD161J-180	CR	18 1/6 W
R69	QRD161J-221	CR	220 1/6 W
R70	QRD161J-223	CR	22 K 1/6 W
R71	QRD161J-504	CR	500 K 1/6 W
R72	QRD161J-103	CR	10 K 1/6 W
R73	QRD161J-102	CR	1 K 1/6 W
R74	QRD161J-180	CR	18 1/6 W
R75	QRD161J-102	CR	1 K 1/6 W
R76	QRD161J-103	CR	10 K 1/6 W
R77	QRD161J-332	CR	3.3 K 1/6 W
R78	–	–	
R79	QRD161J-103	CR	10 K 1/6 W
R80	QRD161J-473	CR	47 K 1/6 W
R81	QRD161J-153	CR	15 K 1/6 W
R82	QRD161J-102	CR	1 K 1/6 W
R83	QRD161J-221	CR	220 1/6 W
R84	QRD161J-332	CR	3.3 K 1/6 W
R85	QRD161J-472	CR	4.7 K 1/6 W
R86	–	–	
R87	QRD161J-333	CR	33 K 1/6 W
R88	QRD161J-103	CR	10 K 1/6 W
R89	QRD161J-223	CR	22 K 1/6 W
R90	QRD161J-473	CR	47 K 1/6 W
R91	QRD161J-473	CR	47 K 1/6 W
R92	–	–	
R93	QRD161J-101	CR	100 1/6 W
R94	QRD161J-103	CR	10 K 1/6 W
R95	QRD161J-221	CR	220 1/6 W
R96	QRD161J-102	CR	1 K 1/6 W
R97	QRD161J-332	CR	3.3 K 1/6 W
R98	QRD161J-471	CR	470 1/6 W
R99	QRD161J-152	CR	1.5 K 1/6 W
R100	QRD161J-221	CR	220 1/6 W
R101	QRD161J-102	CR	1 K 1/6 W
R102	QRD161J-102	CR	1 K 1/6 W
R103	QRD161J-102	CR	1 K 1/6 W
R104	QRD161J-103	CR	10 K 1/6 W
R105	QRD161J-472	CR	4.7 K 1/6 W
R106	QRD161J-472	CR	4.7 K 1/6 W
R107	QRD161J-471	CR	470 1/6 W
R108	QRD161J-472	CR	4.7 K 1/6 W
R109	QRD161J-471	CR	470 1/6 W
R110	QRD161J-103	CR	10 K 1/6 W

Symbol No.	Part No.	Part Name	Description
R111	QRD161J-103	CR	10 K 1/6 W
R112	QRD161J-223	CR	22 K 1/6 W
R113	QRD161J-223	CR	22 K 1/6 W
R114	QRD161J-223	CR	22 K 1/6 W
R115	QRD161J-472	CR	4.7 K 1/6 W
R116	QRD161J-472	CR	4.7 K 1/6 W
R117	QRD161J-221	CR	220 1/6 W
R118	QRD161J-221	CR	220 1/6 W
R119	QRV141F-75R0AY	MFR	75 1/4 W
R120	QRD161J-103	CR	10 K 1/6 W
R121	QRD161J-222	CR	2.2 K 1/6 W
R122	–	–	
R123	QRD161J-223	CR	22 K 1/6 W
R124	–	–	
R125	QRD161J-224	CR	220 K 1/6 W
R126	QRD161J-223	CR	22 K 1/6 W
R127	–	–	
R128	QRD161J-333	CR	33 K 1/6 W
R129	QRD161J-104	CR	100 K 1/6 W
R130	QRD161J-104	CR	100 K 1/6 W
R131	QRD161J-473	CR	47 K 1/6 W
R132	QRD161J-471	CR	470 1/6 W
R133	QRD161J-471	CR	470 1/6 W
R134	QRD161J-180	CR	18 1/6 W
R135	QRD161J-473	CR	47 K 1/6 W
R136	QRD161J-224	CR	220 K 1/6 W
R137	–	–	
R138	–	–	
R139	QRD161J-103	CR	10 K 1/6 W
R140	QRD161J-103	CR	10 K 1/6 W
R141	QRD161J-180	CR	18
R142	QRD161J-180	CR	18
R143	QRD161J-180	CR	18
R144	QRD161J-103	CR	10 K
R145	QRD161J-103	CR	10 K
R150	QRD161J-103	CR	10 K
R200	QRD161J-471	CR	470 1/6 W
R201	QRD161J-101	CR	100 1/6 W
R300	QVPB613-102	VR	1 K R-Y
R301	QVPB613-102	VR	1 K A/D REF. A
R302	QVPB614-203	VR	20 K H. POSITION
R303	–	–	
R304	QVPB613-203	VR	20 K VCO GAIN
R305	–	–	
R306	QVPB613-503	VR	50 K POSTION
R307	QVPB613-502	VR	5 K CBL PULSE
R408	QVPB613-102	VR	1 K D/A REF. A
R309	–	–	
R310	QVPB613-501	VR	500 5.35 LEVEL
R311	–	–	
R312	–	–	
R313	QVPB614-103	VR	10 K SET UP
R314	QVPB613-102	VR	1 K Y. PED
R315	QVPB613-102	VR	1 K B-Y
R316	QVPB613-502	VR	5 K 3H PULSE
RA1	QRB081K-103	Resistor Array	10 K x 8
RA2	QRB081K-103	Resistor Array	10 K x 8

Symbol No.	Part No.	Part Name	Description
RA3	QRB041K-103	Resistor Array	10 K x 4
C1	QER41CM-106	E Cap	10 16 V
C2	QFN41HJ-103	MY Cap	0.01 50 V
C4	QFN41HJ-104	MY Cap	0.1
C5	QER41CM-106	E Cap	10 16 V
C6	QER41CM-476	E Cap	47 16 V
C7	QCZ0206-104	C Cap	0.1
C8	QER41CM-476	E Cap	47 16 V
C10	QER41CM-106	E Cap	10 16 V
C11	QER41CM-476	E Cap	47 16 V
C13	QEPA1HM-105	BP Cap	1 50 V
C14	QCZ0206-104	C Cap	0.1
C15	QER41CM-106	E Cap	10 16 V
C16	QEX41CM-156	E Cap	15 16 V
C17	QER41CM-106	E Cap	10 16 V
C18	QER41CM-106	E Cap	10 16 V
C19	QCZ0206-104	C Cap	0.1
C20	QEX41CM-156	E Cap	15 16 V
C21	QCS11HJ-101	C Cap	100 P
C22	QCS11HJ-101	C Cap	100 P
C23	QER41CM-106	E Cap	10 16 V
C24	QER41CM-476	E Cap	47 16 V
C25	QEX41CM-156	E Cap	15 16 V
C26	QER41CM-476	E Cap	47 16 V
C27	QCZ0206-104	C Cap	0.1
C28	QER41CM-106	E Cap	10 16 V
C29	QCZ0206-104	C Cap	0.1
C30	QER41CM-476	E Cap	47 16 V
C31	QCZ0206-104	C Cap	0.1
C32	QEX41CM-156	E Cap	15 16 V
C33	QCZ0206-104	C Cap	0.1
C34	QER41CM-476	E Cap	47 16 V
C35	QCZ0206-104	C Cap	0.1
C36	QER41CM-476	E Cap	47 16 V
C37	QCZ0206-104	C Cap	0.1
C38	QCS11HJ-101	C Cap	100 P
C39	QFN41HJ-102	MY Cap	1000 P 50 V
C40	QFN41HJ-102	MY Cap	1000 P 50 V
C41	QFN41HJ-102	MY Cap	1000 P 50 V
C42	QER41CM-476	E Cap	47 16 V
C43	QCZ0206-104	C Cap	0.1
C44	–	–	
C45	QCS11HJ-101	C Cap	100 P
C46	QCS11HJ-101	C Cap	100 P
C47	QCZ0206-104	C Cap	0.1
C48	QCS11HJ-820	C Cap	82 P
C49	QCS11HJ-330	C Cap	33 P
C50	QER41CM-106	E Cap	10 16 V
C52	QFN31HJ-222	MY Cap	2200 P 50 V
C53	–	–	16 V
C54	QER41CM-106	E Cap	10 16 V
C56	QCS11HJ-101	C Cap	100 P
C57	QFN41HJ-102	MY Cap	1000 P 50 V
C58	QFN41HJ-102	MY Cap	1000 P 50 V
C59	QER41HM-105	E Cap	1 50 V
C60	QCZ0206-104	C Cap	0.1

Symbol No.	Part No.	Part Name	Description
C61	QER41CM-476	E Cap	47 16 V
C62	QER41CM-476	E Cap	47 16 V
C63	QER41CM-106	E Cap	10 16 V
C64	QER41CM-106	E Cap	10 16 V
C65	QER41CM-476	E Cap	47 16 V
C66	QCZ0206-104	C Cap	0.1
C67	QER41CM-106	E Cap	10 16 V
C68	QEX41CM-156	E Cap	15 16 V
C69	QCZ0206-104	C Cap	0.1
C71	QCS11HJ-102	C Cap	1000 P
C72	QER41HM-105	E Cap	1 50 V
C73	QCZ0206-104	C Cap	0.1
C75	QER41HM-105	E Cap	1 50 V
C76	QEPC1HM-105	BP Cap	1 50 V
C77	QFN41HJ-333	MY Cap	0.033 50 V
C78	QER41HM-105	E Cap	1 50 V
C79	QCS11HJ-101	C Cap	100 P
C80	QCS11HJ-101	C Cap	100 P
C82	QER41HM-106	E Cap	10 50 V
C83	QER41HM-105	E Cap	1 50 V
C85	QCS11HJ-180	C Cap	18 P
C86	QCS11HJ-330	C Cap	33 P
C87	QER41CM-106	E Cap	10 16 V
C88	QAT3001-011	TR Cap	20 P 5.35 LOCK
C89	QCT25CH-100	C Cap	10 P
C90	QFN41HJ-103	MY Cap	0.01 50 V
C91	QFN41HJ-103	MY Cap	0.01 50 V
C92	QCZ0206-104	C Cap	0.1
C93	QER41CM-476	E Cap	47 16 V
C94	QEPA1HM-105	BP Cap	1 50 V
C95	QEPA1HM-105	BP Cap	1 50 V
C96	QEPA1HM-105	BP Cap	1 50 V
C97	QCT25RH-150	C Cap	15 P
C98	QFN31HJ-103	MY Cap	0.01 50 V
C99	QER41CM-106	E Cap	10 16 V
C100	QER41CM-106	E Cap	10 16 V
C101	QFN41HJ-102	MY Cap	1000 P 50 V
C102	QFN41HJ-102	MY Cap	1000 P 50 V
C103	–	–	
C104	QFN41HJ-103	MY Cap	0.01 50 V
C105	QFN41HJ-102	MY Cap	1000 P 50 V
C106	QFN41HJ-333	MY Cap	0.033 50 V
C107	QER41HM-105	E Cap	1 50 V
C108	QCZ0206-104	C Cap	0.1
C109	QER41CM-476	E Cap	47 16 V
C112	QCZ0206-104	C Cap	0.1
C113	QCT25CH-100	C Cap	10 P
C114	QER41CM-476	E Cap	47 16 V
C115	QER41CM-476	E Cap	47 16 V
C116	QCS11HJ-101	C Cap	100 P 50 V
C117	QCS11HJ-101	C Cap	100 P 50 V
C118	QER41CM-476	E Cap	47 16 V
C119	QCZ0206-104	C Cap	0.1
C121	QCZ0206-104	C Cap	0.1
C125	QCZ0206-104	C Cap	0.1
C126	QCZ0206-104	C Cap	0.1

Symbol No.	Part No.	Part Name	Description
C127	QER41CM-476	E Cap	47 16 V
C128	QCZ0206-104	C Cap	0.1
C130	QER41CM-476	E Cap	47 16 V
C131	QCZ0206-104	C Cap	0.1
C132	QCZ0206-104	C Cap	0.1
C133	QCZ0206-104	C Cap	0.1
C134	QER41CM-476	E Cap	47 16 V
C135	QCZ0206-104	C Cap	0.1
C136	QCZ0206-104	C Cap	0.1
C137	QCZ0206-104	C Cap	0.1
C139	QCZ0206-104	C Cap	0.1
C140	QER41CM-476	E Cap	47 16 V
C141	QCZ0206-104	C Cap	0.1
C142	QCZ0206-104	C Cap	0.1
C143	QER41CM-476	E Cap	47 16 V
C144	QCZ0206-104	C Cap	0.1
C145	QCZ0206-104	C Cap	0.1
C146	QCZ0206-104	C Cap	0.1
C147	QCZ0206-104	C Cap	0.1
C148	QCZ0206-104	C Cap	0.1
C149	QCZ0206-104	C Cap	0.1
C150	QCZ0206-104	C Cap	0.1
C151	QCZ0206-104	C Cap	0.1
C152	QCZ0206-104	C Cap	0.1
C153	QCZ0206-104	C Cap	0.1
C154	QCZ0206-104	C Cap	0.1
C155	QER41CM-476	E Cap	47 16 V
C156	QCZ0206-104	C Cap	0.1
C157	QCZ0206-104	C Cap	0.1
C158	QER41CM-476	E Cap	47 16 V
C159	QCZ0206-104	C Cap	0.1
C160	QCZ0206-104	C Cap	0.1
C161	QCZ0206-104	C Cap	0.1
C162	QCZ0206-104	C Cap	0.1
C163	QCZ0206-104	C Cap	0.1
C164	QCZ0206-104	C Cap	0.1
C165	QER41CM-476	E Cap	47 16 V
C166	QCZ0206-104	C Cap	0.1
C167	QCZ0206-104	C Cap	0.1
C168	QCZ0206-104	C Cap	0.1
C169	QCZ0206-104	C Cap	0.1
C170	QCZ0206-104	C Cap	0.1
C171	QCZ0206-104	C Cap	0.1
C172	QCZ0206-104	C Cap	0.1
C173	QER41CM-476	E Cap	47 16 V
C174	QCZ0206-104	C Cap	0.1
C175	QCZ0206-104	C Cap	0.1
C176	QCZ0206-104	C Cap	0.1
C177	QCZ0206-104	C Cap	0.1
C178	QCZ0206-104	C Cap	0.1
C179	QCZ0206-104	C Cap	0.1
C180	QCZ0206-104	C Cap	0.1
C183	QER41CM-476	E Cap	47 16 V
C184	QCZ0206-104	C Cap	0.1
C187	QER41CM-476	E Cap	47 16 V
C188	QCZ0206-104	C Cap	0.1

Symbol No.	Part No.	Part Name	Description
C189	QCZ0206-104	C Cap	0.1
C190	QCZ0206-104	C Cap	0.1
C191	QER41CM-476	E Cap	47 16 V
C192	QCZ0206-104	C Cap	0.1
C193	QCZ0206-104	C Cap	0.1
C194	QCZ0206-104	C Cap	0.1
C195	QCZ0206-104	C Cap	0.1
C196	QCZ0206-104	C Cap	0.1
C197	QER41CM-476	E Cap	47 16 V
C198	QCZ0206-104	C Cap	0.1
C199	QCZ0206-104	C Cap	0.1
C200	QCZ0206-104	C Cap	0.1
C201	QCZ0206-104	C Cap	0.1
C202	QCZ0206-104	C Cap	0.1
C203	QCZ0206-104	C Cap	0.1
C204	QER41CM-476	E Cap	47 16 V
C206	QCS11HJ-101	C Cap	100 P
C210	QER41HM-105	E Cap	1 50 V
C211	QEX41CM-156	E Cap	15 16 V
C212	QCZ0206-104	C Cap	0.1
C213	QER41CM-476	E Cap	47 16 V
C214	QFN41HJ-102	MY Cap	1000 P 50 V
C215	QER41CM-476	E Cap	47 16 V
C216	QER41CM-476	E Cap	47 16 V
C217	QCZ0206-104	C Cap	0.1
C218	QCZ0206-104	C Cap	0.1
C219	QCZ0206-104	C Cap	0.1
CK1	SCV1525-001	CE Filter	5.36 MHz
L1	BL02RN2-R62	EMI Filter	
L2	BL02RN2-R62	EMI Filter	
L3	BL02RN2-R62	EMI Filter	
L4	BL02RN2-R62	EMI Filter	
L5	BL02RN2-R62	EMI Filter	
L6	BL02RN2-R62	EMI Filter	
L7	BL02RN2-R62	EMI Filter	
L8	SCV1202-001	Coil	3 μH REF.H.LOCK
L9	SCV1203-001	Coil	6 μH VTR H.LOCK
X1	SCV1523-001	Crystal	5.357446 MHz
J1	SCV1147-001	Connector	
J2	SCV1147-001	Connector	
J3	SCV1147-001	Connector	

Symbol No.	Part No.	Part Name	Description
S01	SCV1149-001	Socket	
S02	SCV1149-001	Socket	
S03	SCV1149-001	Socket	
SW1	SCV1204-001	Switch	INPUT SELECT
SW2	SCV1199-001	Switch	SET UP
SW3	SCV1131-001	Dip Switch	Y/C TIMING (on board)
SW4	SCV1526-001	Dip Rotary Switch	Y/C TIMING (escutcheon)
CN2	SCV1227-008	Connector	8-pin
CN28	SCV1197-090	Connector	90-pin
• CBM1	**CBMC4241-00A**	**VIDEO AMP CBM**	
• CBM2	**CBMC4241-00A**	**VIDEO AMP CBM**	
• CBM3	**CBMC4241-00A**	**VIDEO AMP CBM**	
Q1	2SC2814(F4, 5)	Transistor	MATSUSHITA
Q2	2SC2814(F4, 5)	Transistor	MATSUSHITA
Q3	2SC2814(F4, 5)	Transistor	MATSUSHITA
Q4	2SC2814(F4, 5)	Transistor	MATSUSHITA
D1	MA152K	Diode	MATSUSHITA
R1	NRSA02J-332	Chip R	3.3 K 1/10 W
R2	NRSA02J-222	Chip R	2.2 K 1/10 W
R3	NRSA02J-102	Chip R	1 K 1/10 W
R4	NRSA02J-102	Chip R	1 K 1/10 W
R5	NRSA02J-102	Chip R	1 K 1/10 W
R6	NRSA02J-222	Chip R	2.2 K 1/10 W
R7	NRSA02J-102	Chip R	1 K 1/10 W
C1	NCF21HZ-473	C Cap	0.047 50 V
C2	NCF21HP-473	C Cap	0.047 50 V
• SW board assembly			
R200	QRD161J-471	CR	470 1/6 W
R201	QRD161J-221	CR	220 1/6 W
SW3	SCV1208-010	Switch	FIELD
SW4	SCV1208-010	Switch	FRAME
SW5	SCV1208-030	Switch	OPERATE/BY-PASS

7.8 PB DET board assembly [0][8] [0][8][ ][ ][ ][ ][ ][ ]

Symbol No.	Part No.	Part Name	Description
IC1	TA7357AP	IC	TOSHIBA
IC2	TA7357AP	IC	TOSHIBA
IC3	TC4528BP	IC	TOSHIBA
IC4	TC4013BAP	IC	TOSHIBA
IC5	NJM2903D	IC	JRC
Q1	2SC1685(R)	Transistor	
Q2	2SC1685(R)	Transistor	
Q3	2SC1685(R)	Transistor	
D1	MA165	Diode	MATSUSHITA
R1	QRD161J-333	CR	33 K 1/6 W
R2	QRD161J-223	CR	22 K 1/6 W
R3	QRD161J-223	CR	22 K 1/6 W
R4	QRD161J-152	CR	1.5 K 1/6 W
R5	QRD161J-222	CR	2.2 K 1/6 W
R6	QRD161J-222	CR	2.2 K 1/6 W
R7	QRD161J-333	CR	33 K 1/6 W
R8	QRD161J-223	CR	22 K 1/6 W
R9	QRD161J-124	CR	120 K 1/6 W
R10	QRD161J-123	CR	12 K 1/6 W
R11	QRD161J-474	CR	470 K 1/6 W
R12	QRD161J-123	CR	12 K 1/6 W
R13	QRD161J-103	CR	10 K 1/6 W
R14	QRD161J-103	CR	10 K 1/6 W
R15	QRD161J-124	CR	120 K 1/6 W
R16	QRD161J-123	CR	12 K 1/6 W
R17	QRD161J-474	CR	470 K 1/6 W
R18	QRD161J-123	CR	12 K 1/6 W
R19	QRD161J-103	CR	10 K 1/6 W
R20	QVPB614-103	VR	10 K
R21	QRD161J-682	CR	6.8 K 1/6 W
R22	QVPB614-503	VR	50 K
R23	QRD161J-682	CR	6.8 K 1/6 W
R24	QRD161J-474	CR	470 K 1/6 W
R25	QRD161J-474	CR	470 K 1/6 W
R26	QRD161J-333	CR	33 K 1/6 W
R27	QRD161J-223	CR	22 K 1/6 W
R28	QRD161J-472	CR	4.7 K 1/6 W
R29	QRD161J-472	CR	4.7 K 1/6 W
R30	QRD161J-100	CR	10 1/6 W
R31	QRD161J-102	CR	1 K 1/6 W
R32	QRD161J-102	CR	1 K 1/6 W
R33	QRD161J-472	CR	4.7 K 1/6 W
C1	QEPA1CM-106	BP Cap	10 16 V
C2	QER41CM-476	E Cap	47 16 V
C3	QEPA1CM-106	BP Cap	10 16 V
C4	QER41CM-476	E Cap	47 16 V
C5	QFN41HJ-104	MY Cap	0.1 50 V
C6	QCS11HJ-561	C Cap	560 P 50 V
C7	QFN41HJ-473	MY Cap	0.047 50 V
C8	QCS11HJ-470	C Cap	47 P 50 V
C9	QEPA1CM-106	BP Cap	10 16 V
C10	QFN41HJ-104	MY Cap	0.1 50 V
C11	QCS11HJ-561	C Cap	560 P 50 V
C12	QFN41HJ-473	MY Cap	0.047 50 V
C13	QCS11HJ-470	C Cap	47 P 50 V
C14	QCS11HJ-101	C Cap	100 P 16 V
C15	QFN41HJ-104	MY Cap	0.1 50 V

Symbol No.	Part No.	Part Name	Description
C16	QFN41HJ-104	M Cap	0.1 50 V
C17	QER41CM-476	E Cap	47 16 V
C18	QER41CM-476	E Cap	47 16 V
C19	QER41CM-476	E Cap	47 16 V
C20	QER41CM-476	E Cap	47 16 V
C21	QFN41HJ-103	M Cap	0.01 50 V
C22	QER41CM-476	E Cap	47 16 V
CN1	SCV1074-004	Connector	4 Pin Y/C IN
CN2	SCV1074-004	Connector	4 Pin Y/C OUT
CN3	SCV1228-002	Connector	2 Pin SC IN
CN4	SCV1228-002	Connector	2 Pin SC OUT
CN5	SCV1228-004	Connector	4 Pin

7.9 SG board assembly [0][9] [0][9][ ][ ][ ][ ][ ]

Symbol No.	Part No.	Part Name	Description
IC1	SCV0322-002	IC	JVC
IC2	UPD74HC04C	IC	NEC
IC3	SCV0486-001	IC	JVC
IC4	HA11244	IC	HITACHI
IC5	TC40H002P	IC	TOSHIBA
IC6	TC40H000P	IC	TOSHIBA
IC7	TC40H000P	IC	TOSHIBA
IC8	TC40H000P	IC	TOSHIBA
IC9	TC4528BP	IC	TOSHIBA
IC10	TC4053BFTP2	IC	TOSHIBA
IC11	SN74LS93N	IC	MOTOROLA
IC12	TL082CP	IC	TEXAS
IC13	SCV0757-001	IC	JVC
IC14	SCV0758-001	IC	JVC
IC15	SCV0759-001	IC	JVC
IC16	SCV0471-002	IC	JVC
IC17	SCV0471-012	IC	JVC
IC18	SCV0532-001	IC	JVC
IC19	AN614	IC	MATSUSHITA
IC20	AN614	IC	MATSUSHITA
IC21	SCV0933-001	IC	JVC
Q1	2SC2295(B.C)	Transistor	
Q2	2SC2295(B.C)	Transistor	
Q3	2SC2295(B.C)	Transistor	
Q4	2SC2295(B.C)	Transistor	
Q5	2SC2295(B.C)	Transistor	
Q6	2SC2295(B.C)	Transistor	
Q7	2SC2295(B.C)	Transistor	
Q8	2SA1022(B.C)	Transistor	
Q9	2SC2295(B.C)	Transistor	
Q10	2SA1022(B.C)	Transistor	
Q11	2SA1022(B.C)	Transistor	
Q12	DTC124K	Digital Transistor	
Q13	2SA1022(B.C)	Transistor	
Q14	2SC2295(B.C)	Transistor	
Q15	2SC2295(B.C)	Transistor	
Q16	2SC2295(B.C)	Transistor	
Q17	2SC2295(B.C)	Transistor	
Q18	2SC2295(B.C)	Transistor	
Q19	2SC2295(B.C)	Transistor	
Q20	2SC2295(B.C)	Transistor	
Q21	2SC2295(B.C)	Transistor	
Q22	2SC2295(B.C)	Transistor	
Q23	2SJ84(Q.R)	FET	
Q24	2SK198(Q.R)	FET	
Q25	2SC2295(B.C)	Transistor	
Q26	2SA1022(B.C)	Transistor	
Q27	2SC2295(B.C)	Transistor	
Q28	2SA1022(B.C)	Transistor	
Q29	DTC124K	Digital Transistor	
Q30	2SA1022(B.C)	Transistor	

Symbol No.	Part No.	Part Name	Description
D1	SVC321(A)	V.C. Diode	
D2	MA152A	Diode	
D3	SVC321(A)	V.C. Diode	
D6	SVC321(A)	V.C. Diode	
D9	MA152A	Diode	
D10	MA152A	Diode	
R37	QVPB613-104	VR	SC OFFSET 100 K
C1	NCB21HK-103	C Cap	0.01
C2	NCS21HJ-220	C Cap	22 P
C3	NCB21HK-103	C Cap	0.01
C4	NCT03CH-101	C Cap	100 P
C5	NCT03CH-101	C Cap	100 P
C6	NCT03CH-560	C Cap	56 P
C8	NCB21HK-103	C Cap	0.01
C9	NCF21EZ-104	C Cap	0.1
C10	NCB21HK-103	C Cap	0.01
C11	QEJ41CM-106	T Cap	10 16 V
C12	NCS21HJ-151	C Cap	150 P
C13	QEJ41AM-106	T Cap	10 10 V
C14	QEJ41CM-106	T Cap	10 16 V
C15	NCB21HK-103	C Cap	0.01
C16	QEJ41AM-106	T Cap	10 10 V
C17	NCT03CH-101	C Cap	100 P
C18	NCB21HK-103	C Cap	0.01
C19	QEJ41CM-106	T Cap	10 16 V
C20	NCT03CH-390	C Cap	39 P
C21	NCB21HK-333	C Cap	0.033
C22	NCF21EZ-104	C Cap	0.1
C23	QEJ41AM-476	T Cap	47 10 V
C25	QEJ41VM-105	T Cap	1 35 V
C26	QEJ41AM-106	T Cap	10 10 V
C27	QEJ41VM-105	T Cap	1 35 V
C28	QEJ41VM-105	T Cap	1 35 V
C29	QEJ41AM-476	T Cap	47 10 V
C30	QER41HM-475	E Cap	4.7 50 V
C31	QER41HM-105	E Cap	1 50 V
C32	QER41HM-475	E Cap	4.7 50 V
C33	QEJ41AM-106	T Cap	10 10 V
C34	NCB21HK-272	C Cap	2700 P
C35	NCS21HJ-561	C Cap	560 P
C36	NCF21EZ-104	C Cap	0.1
C37	QER41HM-105	E Cap	1 50 V
C38	NCS21HJ-221	C Cap	220 P
C39	QEJ41AM-106	T Cap	10 10 V
C40	NCF21EZ-104	C Cap	0.1
C41	NCF21EZ-104	C Cap	0.1
C42	NCF21EZ-104	C Cap	0.1
C43	NCF21EZ-104	C Cap	0.1
C44	NCS21HJ-470	C Cap	47 P
C45	NCS21HJ-470	C Cap	47 P
C46	QER41EM-106	E Cap	10 25 V

7.10 PS board assembly [10] [10]□□□□□□

Symbol No.	Part No.	Part Name	Description
C47	NCF21EZ-104	C Cap	0.1
C48	NCF21EZ-104	C Cap	0.1
C49	NCT03CH-470	C Cap	47 P
C50	QAT3001-011	TR Cap	20 P SC LOCK
C51	NCF21EZ-104	C Cap	0.1
C52	NCF21EZ-104	C Cap	0.1
C54	QEJ41AM-106	T Cap	10 10 V
C56	QER41AM-476	E Cap	47 10 V
C57	QER41EM-106	E Cap	10 25 V
C58	QAT3001-011	TR Cap	20 P H LOCK
C59	NCB21HK-103	C Cap	0.01
C60	NCT03CH-101	C Cap	100 P
C61	QETC1AM-227	C Cap	220 10 V
C62	QER41EM-106	E Cap	10 25 V
C63	QER41CM-476	E Cap	47 16 V
C64	QEJ41CM-476	T Cap	47 16 V
C65	NCS21HJ-330	C Cap	33 P
C66	NCB21HK-103	C Cap	0.01
C67	NCF21EZ-104	C Cap	0.1
C68	QER41HM-476	E Cap	47 10 V
C69	QER41AM-476	E Cap	47 10 V
C70	NCB21HK-103	C Cap	0.01
C71	QEJ41AM-106	C Cap	10 10 V
C72	NCB21HK-103	C Cap	0.01
C73	NCB21HK-103	C Cap	0.01
C74	NCF21EZ-104	C Cap	0.1
C75	QEJ41CM-106	T Cap	10 16 V
C77	NCT03CH-101	C Cap	
C78	NCF21EZ-104	C Cap	
C79	NCT03CH-560	C Cap	
C81	NCB21HK-103	C Cap	
C82	QEX41AM-156	E Cap	
C83	NCT03CH-150	C Cap	
L1	SCV0331-820	Peaking Coil	82 μH
L2	SCV0331-120	Peaking Coil	12 μH
L3	SCV0331-220	Peaking Coil	22 μH
L5	SCV0331-101	Peaking Coil	100 μH
L6	SCV0331-470	Peaking Coil	47 μH
LC1	EXC-EMT102BT	EMI Filter	
T1	SCV0171-001	RF Trans	
T2	SCV0171-001	RF Trans	
X1	SCV0352-001	CRYSTAL	
X2	SCV0348-002	CRYSTAL	
X3	SCV0349-002	CRYSTAL	
CN1	SCV0343-001	Connector	
CN36	SCV1227-002	Connector	

Symbol No.	Part No.	Part Name	Description	
⚠ IC1	SCV1508-IC1	Function Module		
IC51	SI-3122V	IC	SANKEN	
IC52	NJM7812FA	IC	JRC	
⚠ TR1	2SK719	FET	NEC	
D1	ERB44-10	Diode	FUJI ELECTRIC	
D52	S5688B	Diode	TOSHIBA	
D53	RL4ZLF-J1	Diode	SANKEN	
D54	S5688B	Diode	TOSHIBA	
D55	1SS120	Diode	HITACHI	
LED51	GL-3PR7	LED	SHARP	
⚠ ZD1	MTZ12B	Zenner Diode	ROHM	
⚠ SS1	2JB41	Diode Bridge	TOSHIBA	
SS52	10CS04SM	Diode Bridge	NEC	
SS53	ESAB92M-02	Diode Bridge	FUJI ELECTRIC	
TH1	SCV1508-TH1	Thermister		
R1	QRG026J-333	OMR	33 K	2 W
R2	QRG126J-220A	OMR	22	1/2 W
R3	QRG029J-1R0	OMR	1	2 W
R51	QRG016J-101	OMR	100	1 W
R52	QRD161J-820	CR	82	1/6 W
R53	QRD161J-222	CR	2.2 K	1/6 W
R54	QRV141F-1601	MFR	1.6 K	1/4 W
R55	QRV141F-1201	MFR	1.2 K	1/4 W
R56	QRD161J-222	CR	2.2 K	1/6 W
R57	QRD161J-222	CR	2.2 K	1/6 W
R58	QRG016J-101	OMR	100	1 W
VR51	SCV0600-103	VR	10 K	
⚠ C1	QFZ9022-224	C Cap	0.22	250 V
⚠ C2	–	–		
⚠ C3	QCZ9016-222A	C Cap	2200 P	AC 400 V
⚠ C4	QCZ9016-332A	C Cap	3300 P	AC 400 V
⚠ C5	SCV1508-C05	E Cap	120	400 V
⚠ C6	SCV1508-C06	C Cap	0.022	400 V
⚠ C7	SCV1508-C07	C Cap	220 P	2 kV
C51	SCV1508-C51	E Cap	1000	10 V
C52	SCV1508-C51	E Cap	1000	10 V
C53	SCV1508-C51	E Cap	1000	10 V
C54	SCV1508-C54	E Cap	10	50 V
C55	SCV1508-C55	C Cap	0.01	AC 250 V
C56	SCV1508-C56	E Cap	220	35 V
C57	SCV1508-C56	E Cap	220	35 V
C58	SCV1508-C58	E Cap	220	25 V
C59	SCV1508-C55	C Cap	0.01	AC 250 V
C60	SCV1508-C56	E Cap	220	35 V

Symbol No.	Part No.	Part Name	Description
C61	SCV1508-C61	E Cap	47 25 V
C62	SCV1508-C51	E Cap	1000 10 V
⚠T1	SCV1508-T01	Drive Trans	
⚠ L1	SCV1508-L01	Coil	
⚠ L51	SCV1508-L51	Coil	
⚠F1	QMF51A2-3R15	Fuse	T3.15 A 250 V
CN1	SCV1508-CN1	Connector	
CN2	SCV1508-CN2	Connector	